

1946 EDITION

The INDEX of TRAINING FILMS



A GUIDE TO MATERIALS AVAILABLE FOR INDUSTRIAL TRAINING

From the collection of the

o P^zreⁿfinger^m
v L^aibrary
t p

San Francisco, California
2008

C O M P L I M E N T S O F

Eastman Kodak Company

TABLE OF CONTENTS

Aviation Industry

Aerodynamics	9
Aircraft Engineering	10
Aircraft Power Plant	
Principles	11
Assembly & Disassembly	11
Electrical System	11
Fuel System	12
Inspection & Maintenance	13
Lubrication	14
Operation	14
Propellers	14
Aircraft Production	
Alighting Gear	20
Assembling, Riveting & Welding	15
Controls	17
Control Surfaces	17
Sheet Metal Fabrication	18
Structures	18
Wood Fabrication	19
Miscellaneous	19
Aircraft Inspection	20
Aircraft Maintenance	
Alighting Gear	20
Controls & Control Surfaces	21
Structure	21
Miscellaneous	22
Aviation—Miscellaneous	22
<i>Additional Titles</i>	86

Automotive Industry

Bus Operation	23
Engineering	
Brakes	23
Body	24
Electrical System	24
Engines	25
Transmission	26
Wheels & Mounting	26
General	27
<i>Additional Titles</i>	86

Ceramics & Glass

Films on ceramics and glass	27
<i>Additional Titles</i>	86

Chemical Industry

Films of chemical industry	28
<i>Additional Titles</i>	87

Electronics

Electronic Theory	30
Generators & Motors	32
Electrical Measurement	33
Motor Maintenance	33
Radio & Communication	34
Wiring	35
Miscellaneous	36
<i>Additional Titles</i>	87

Engineering

Civil Engineering	37
Drafting—Design—Blueprints	37
Mathematics	39
Measuring & Testing	40
<i>Additional Titles</i>	87

Engines

Diesel Engines	41
Internal Combustion	41
Steam Engines	42
<i>Additional Titles</i>	88

Foundry & Forging

General	42
Die Casting	43
Forging	43
Melting Practice	43
Molding—Bench	43
Molding—Floor	43
Molding—Machine	44

Hydraulics

Films on Hydraulics	44
---------------------------	----

Industrial Relations

Customer Research	44
Labor—Management Relations	44
Supervision	45
Time & Motion Study	47
<i>Additional Titles</i>	88

Machine Shop

Abrasives & Grinding	49
Bench & Hand Work	51
Boring Mill, Horizontal	52
Boring Mill, Vertical	52
Broaching	52
Cutting Tools	53
Drill Press	53
Gear Hobbing	53
Lathes	54
Metal Cutting Band Saw	56
Milling Machines	56
Planing & Shaping	57
Precision Measurement, Inspection & Testing	58
Miscellaneous	59
<i>Additional Titles</i>	88

Materials & Metals

Aluminum	60
Bearings	60
Copper	60
Heat Treatment	61
Iron & Steel	61
Lead	62
Magnesium	63
Mica	63
Nickel	63
Pipe & Tubing	63
Plating	63
Tin	64
Wire	64
Miscellaneous	64
<i>Additional Titles</i>	89

Office Practice

Films on office practice	64
<i>Additional Titles</i>	89

Optics-Photography

Films on optics & photography	65
<i>Additional Titles</i>	89

Petroleum Industry

Films on petroleum industry	66
<i>Additional Titles</i>	90

Physics

Films on physics principles	67
<i>Additional Titles</i>	90

Plastics Industry

Films on plastics industry	69
<i>Additional Titles</i>	90

Refrigeration		Wood & Lumber	
Principles	70	Pattern Making	78
Commercial Units	70	Wood Finishing	80
Domestic Units	71	Wood Working	80
		<i>Additional Titles</i>	91
Sheet Metal		Other Industries	
Films on sheet metal shop	71	Bellows	82
Shipbuilding		Brushes	82
Coppersmithing	73	Building Trades	82
Marine Electricity	73	Cement Industry	82
Marine Machinery Installation	74	Coal Industry	82
Painting	74	General Industry	83
Pipefitting	74	Insulation Industry	83
Shipfitting	75	Painting	83
<i>Additional Titles</i>	90	Paper Industry	83
Welding		Railroad Industry	83
Films on welding processes	76	Rubber Industry	84
<i>Additional Titles</i>	90	Textile & Clothing Industries	84
		Thermodynamics	85

How to Use the INDEX

A KEY TO ABBREVIATIONS AND SYMBOLS: NOTES ON HANDLING FILMS

Included in this first edition of THE INDEX of TRAINING FILMS are listings of more than 1700 motion pictures, slidefilms and slides. Both sound and silent materials are included. They have been specifically selected for their usefulness in industrial-vocational training. Approximately 400 of these subjects were produced for direct sale to industry and the schools by the U. S. Office of Education; others are available on free loan through sponsoring companies such as Aluminum, General Electric, Linde, U. S. Steel and Westinghouse. The following suggestions will assist the training director in making effective use of these references:

Sources of Subjects: Titles are listed alphabetically under the various industry classifications noted in the Table of Contents. After each of these titles, there appears an abbreviated key to the source, *i.e. the original sponsor, distributor, or producer.* (Example: *EBFilms, etc.*) These source "keys" are listed alphabetically in the front section of this guide (a departure from usual custom) so as to better acquaint the user with abbreviations frequently used and so that he may more readily identify the nature of the source, whether producer, sponsoring company, library, etc.

Rental, Purchase or Free Loan? Subjects listed in THE INDEX are made available on outright purchase of prints (USOE), by rental and lease-to-own plans (Bray, EBFilms) and by free loan, requiring only payment of shipping charges. Wherever possible, sale prices have been given where prints are sold; likewise, rental charges have been noted and, finally, subjects in the "free loan" group may be usually identified by the nature of the source, as in the case of sponsoring industrial and commercial organizations. When in doubt, write, wire or phone the source for details before booking the film.

Alphabetical Title Index: To help the trainer find subjects when the title only is known, a complete alphabetical title index to all subjects appears on Pages 93-104.

Key to Abbreviations: 35 indicates 35 millimeter; 16 is 16 millimeter (the most frequent motion picture listing). Si indicates silent motion pictures or filmstrips (*i.e.* slidefilms). Sd indicates sound, either motion picture or *sound* slidefilm (35mm filmstrip is accompanied by disc recording of 33-1/3 rpm type). (19 min) indicates the running time. Length is also indicated by number of frames shown in slidefilm listings. Where subject is in color, it is most often noted as "color" in the various listings.

Caution on Equipment: A great majority of listings in THE INDEX under "motion pictures" are of 16 millimeter *sound* subjects. Do not attempt to show these single-sprocket films on a silent-type projector which is equipped with double sprockets. The sound-track film will be mutilated. *Silent* films can be shown on either silent or sound equipment. All sound slidefilms listed require use of sound slidefilm projector-playback equipment or an additional slow-speed turntable and amplifier to accompany the projected still pictures.

Preview Is the Best Rule: The best single suggestion the Editors can make here is to *preview all films* before use in the training classroom. Allow sufficient time by booking as far in advance as possible and then see all films before showing to trainees. Plan the lesson carefully; do not use films if they are not directly suitable to the training lesson. These are not "entertainment" subjects; their use depends on good trainers and good training procedures. Definitely preview all films offered for purchase, either by rental or otherwise.

A Word of Introduction

THE USE of audio and visual training materials in industry has made significant advances in the past five years. The impetus of war training needs in the armed forces and war industries has brought forth a sizable inventory of available motion pictures, slidefilms and other materials as well as proven techniques for getting effective training results through their application.

This film INDEX is the first classified industrial inventory of these *available* training materials. It is a non-profit contribution to better training which opens wide the door to these war-tested methods and materials. These inventories of films serve many fields of industry and make possible a modest introduction to visual training for many thousands of small plants, maintenance and service shops. Beyond this door lies further opportunity for advancement, soundly based on experience modestly acquired in effective training utilization.

Many of the films listed here have been sponsored by industry itself and are made available on "free loan" to other concerns, vocational schools, engineering groups, etc. Prints are often limited and growing demand requires cooperation by the borrower through early requests, alternate booking dates and prompt return. These suggestions also apply to rented materials.

Regular training use of films is the surest way to use them successfully. A 16mm sound motion picture projector, a 35mm filmstrip projector, turntable and amplifier (for slidefilms, sound and silent) and an opaque or indirect projector and a portable screen are the most useful equipment purchases. A modest budget for purchase of prints regularly used and a minimum of storage equipment will pay real dividends through the convenience and accessibility of these training materials.

The development of good utilization techniques is worth noting. An excellent

case in point is that of the 457-unit visual training program produced by the U. S. Office of Education's warborn Division of Visual Aids. Produced by 35 of the nation's experienced industrial film makers, these sound motion picture films are accompanied by 35mm filmstrips for class review and each subject is further supplemented by a carefully prepared instructor's manual containing review questions, references and the film commentary.

Safety films are not included in this INDEX. The Editors prepared a special listing in this area two years ago. This effort has now been assumed by the National Safety Council for whom the original catalog was compiled. A new edition is now in publication. Information concerning safety films will be supplied on request to the Editors of THE INDEX, 157 E. Erie Street, Chicago (11) Illinois.

Only films related to the field of industrial-vocational training have been included in this guide. For the general field of visual education there are excellent source lists already available from such competent publishers as the H. W. Wilson Company and others. Sales training and the field of distributive education will be served in another specific edition of this guide to be published later.

This first edition of THE INDEX will be supplemented and revised frequently. Hundreds of these listings first appeared in the pages of our publications and have been made freely available to other sources. Changes and additions will be published in BUSINESS SCREEN throughout the year in a form suitable for pasting into these pages. Films are withdrawn frequently, often without previous notice, and new titles appear constantly.

The safest rule to follow is to *order early, preview thoroughly* and use these training materials wisely. They can pay dividends in better morale and improved production.

—THE EDITORS

Sources of Films Available

(A KEY TO ABBREVIATIONS OF SOURCES LISTED)

- Abrasives:** Abrasives Co., Tacony & Fraley Sts., Philadelphia, Pa.
- Acme Mach:** Acme Machinery Co., 4553 St. Clair Ave., NE, Cleveland, O.
- Adel:** Adel Precision Products Corp., 10777 Van Owen, Burbank, Cal.
- Air Reduction:** Air Reduction Sales Co., 60 E. 42nd St., N. Y. City 17.
- AISC:** American Institute of Steel Construction, Dept. Educational Service, 101 Park Ave., N. Y. City 17.
- Allegheny Ludlum:** Allegheny Ludlum Steel Corp., Brackenridge, Pa.
- Allen:** Allen Equipment Co., Kalamazoo, Mich.
- Allis Chalmers:** Allis-Chalmers Manufacturing Co., 1126 S. 70th St., Milwaukee 1, Wisc.
- Aluminum Co.:** Aluminum Company of America, Motion Picture Dept., Gulf Bldg., Pittsburgh 19, Pa.
- Am Brass:** American Brass Co., Waterbury 88, Conn.
- Am Soc for Metals:** American Society for Metals, 7301 Euclid Ave., Cleveland.
- Amco:** American Can Co., 230 Park Ave., N. Y. City 17.
- American Viscose:** American Viscose Corp., 350 5th Ave., N. Y. City 1.
- American Walnut:** American Walnut Manufacturers Association, 616 S. Michigan Blvd., Chicago 5, Ill.
- AMNH:** American Museum of Natural History, 79th & Central Pkwy., N. Y.
- Anaconda:** Anaconda Copper Mining, 25 Broadway, N. Y. City 4.
- Anthracite Inst.:** Anthracite Institute & Anthracite Industries, Inc., 101 Park Ave., N. Y. City 17.
- Armco:** American Rolling Mill Co., 703 Curtis, Middleton, O.
- ASBE:** American Society of Bakery Engineers, Dept. of Visual Education, 208 3rd Ave., SE, Minneapolis 14, Minn.
- AT & T:** American Telephone & Telegraph Co., 195 Broadway, N. Y. City.
- Atlas:** Atlas Educational Film Co., Oak Park, Ill.
- B & H:** Bell & Howell Co., (Filmosound Division) 1801 W. Larchmont Ave., Chicago 13, Ill.
- Bailey:** Bailey Film Service, 1651 Cosmo St., Hollywood 28, Cal.
- Bakelite:** Bakelite Corp., (Unit of Union Carbide & Carbon) 30 E. 42nd St., N. Y.
- Ball Bros.:** Ball Brothers (Mason Jars) 9th & Macedonia, Muncie, Ind.
- Bausch & Lomb:** Bausch & Lomb Optical Co., 635 St. Paul, Rochester, N. Y.
- Behr Manning:** Behr-Manning Corp., Division Norton Co., Troy, N. Y.
- Bell Aircraft:** Bell Aircraft Corp., 2050 Elmwood Ave., Buffalo 7, N. Y.
- Bendix:** Bendix Aviation Corp., Fischer Bldg., Detroit, Mich.
- Bethlehem:** Bethlehem Steel Co., Bethlehem, Pa.
- B G Spark Plug:** B. G. Corp., 136 W. 52nd St., N. Y. City 19.
- BIS:** British Information Services, 30 Rockefeller Plaza, N. Y. City 20; 360 N. Michigan Ave., Chicago 1, Ill.; 391 Sutter St., San Francisco 8, Cal.; 1005 Taft Bldg., 1680 N. Vine St., Hollywood 28, Cal.; 1336 New York Ave., NW, Washington 5, D.C.; 1309 First National Bank Bldg., Atlanta 3, Ga.
- Boonton:** Boonton Molding Co., Film Office, 122 E. 42nd St., New York City.
- Boots:** Boots Aircraft Nut Corp., New Canaan, Conn.
- Brandon:** Brandon Films, 1600 Broadway, N. Y. City.
- Bray:** Bray Pictures Corp., 729 7th Ave., N. Y. City.
- Breskin:** Breskin Publishing Co., Film Booking Dept., Chanin Bldg., 122 E. 42nd St., N. Y. City 17.
- Bus Ed:** Business Education Visual Aids, Dept. 15c, 330 W. 72nd St., N. Y. City.
- Bus Films:** Business Films, 2153 K St., NW, Washington 7, D.C.
- By-Products Ammonia:** By-Products Ammonia, Educational & Research Bureau, 50 W. Broad St., Columbus 15, O.
- Cabot:** Godfrey L. Cabot, Inc., 141 Milk, Boston 9, Mass.
- Calumet:** Calumet Oil Co., 4321 S. Western Ave., Chicago, Ill.
- Camera:** Camera Shop, 1021 Pacific Ave., Tacoma, Wash.
- Canadian Pacific:** Canadian Pacific Railway Co., Windsor Station, Montreal.
- Cannon Electric:** Cannon Electric Development Co., 3209 Humboldt, Los Angeles 31, Cal.
- Caravel:** Caravel Films, Inc., 730 5th Ave., N. Y. City.
- Carborundum:** Carborundum Co., Niagara Falls, N. Y.
- Castle:** Castle Films, Inc., contracting distributor for film sales of the U. S. Office of Education, Division of Visual Aids, Castle Films, Inc., 30 Rockefeller Plaza, N. Y. City 20. Branch offices at 135 S. La Salle St., Chicago, Ill., and Russ Bldg., San Francisco 4, Cal.
- Caterpillar:** Caterpillar Tractor Co., Peoria, Ill.

Celanese: Celanese Plastics Corp., 130 Madison Ave., N. Y. City 16.
Champion: Champion Spark Plug Co., 904 Upton Ave., Toledo 1, O.
Chicago Tribune: Chicago Tribune, Public Service Bureau, 1 S. Dearborn St., Chicago, Ill.
Chrysler: Chrysler Corp., 341 Massachusetts Ave., Highland Park 31, Mich.
Cin Mill: Cincinnati Milling Machine, Marburg Ave., Cincinnati 9, O.
Cl Moly: Climax Molybdenum Co., 500 5th Ave., N. Y. City 18.
Cleveland: Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Cleveland Pneumatic: Cleveland Pneumatic Tool Co., 3781 E. 77th, Cleveland, O.
Cocking: Floyd W. Cocking, 4757 Constance Dr., San Diego, Cal.
College Film: College Film Center, 84 E. Randolph, Chicago 1, Ill.
Columbia Pictures: Columbia Pictures Corp., 729 7th Ave., N. Y. City 19.
Columbia Tool: Columbia Tool Steel Co., Chicago Heights, Ill.
Com. Ind.: Commercial Industrial, 1000 N. Dearborn St., Chicago 10, Ill.

SOURCES OF FILMS AVAILABLE

ours & Co., Rayon Division, Wilmington 93, Delaware.
Eastin: Eastin 16mm Pictures, 707 Putnam Bldg., Davenport, Ia.
EBFilms: Encyclopaedia Britannica Films, 20 North Wacker Drive, Chicago.
Edison: Thomas A. Edison, Inc., West Orange, N. J.
Edit PS: Edited Pictures System, 330 W. 42nd St., N. Y. City.
Elec Motor: Electric Motor Corp., 1211-1221 State, Racine, Wisc.
Elec Research: Sentinel Radio Corp., 2020 Ridge Ave., Evanston, Ill.
Electric Arc: Electric Arc Co., 152 Jelliff Ave., Newark, N. J.
Electro-Chemical Eng: Electro-Chemical Engineering Co., 111 Liberty St., N. Y. City.
Esso: Standard Oil Company of New Jersey, 26 Broadway, N. Y. City 1.
Fe Pr: Federal Products Corp., 1144 Eddy St., Providence 1, R. I.
Fi Pr: Film Production Co., 3650 N. Fremont Ave., Milwaukee 18, Wis.
Fla. Ind.: Florida Industrial, 1000 N. Dearborn St., Chicago 10, Ill.

To the User of this INDEX:

Supplementary references, changes in listings, and reviews of the latest training films, slides and other materials will be published regularly in the INDEX SUPPLEMENT columns of each issue of

BUSINESS SCREEN MAGAZINE

157 EAST ERIE STREET, CHICAGO (11) ILLINOIS

Use the attached Subscription Order Form

tonwood St., Philadelphia, Pa.
De Vry: De Vry Films & Laboratories, 1111 Armitage Ave., Chicago 11, Ill.
Denver: Denver & Rio Grande Western Railroad, Rio Grande Bldg., Denver 1, Colo.
Detroit Board of Ed: Detroit Board of Education, Detroit, Mich.
Douglas: Douglas Aircraft Co., Inc., Industrial Training Dept., 3000 Ocean Park Blvd., Santa Monica, Cal.
Douglas Fir: Douglas Fir Plywood Assn., 301 Tacoma Bldg., Tacoma 2, Wash.
Dow: Dow Chemical Co., Midland, Mich.
Du Pont: E. I. Du Pont de Nemours Co., Wilmington 93, Delaware.
Du Pont Rayon: E. I. Du Pont de Nem-

of Com-
 City.
 titute, Ta-
 .
 iber Co.,
 17, O.
 s St., De-
 aefer Rd.,
 Co., 4614
 O.
 251 South
 md, Ore.
 s., 122 E.
 the Loom
 City 18.
Fuller: Fuller Brush Co., 3530 Main, Hartford, Conn.
Fulton: The Fulton Sylphon Co., Knoxville 1, Tenn.
Gallen Kamp: (See SVE).
Ganz: W. J. Ganz, 19 E. 47th St., N. Y.
GE: General Electric Co., Visual Instruction Section, 1 River Road, Schenectady, N. Y. Branch Offices: 920 SW 6th Ave., Portland, Ore.; Department of Visual Instruction, U. of California, Berkeley, Cal.; 235 Montgomery St., San Francisco, Cal.; 212 N. Vignes St., Los Angeles, Cal.; 200 S. Main St., Salt Lake City, Utah; 650 17th St., Denver, Colo.; 1301 N. Lamont St., Dallas, Tex.; 4966 Woodland Ave., Cleveland, O.; 137 Spring St., NW, Atlanta, Ga.; 1405 Lo-

Sources of Films Available

(A KEY TO ABBREVIATIONS OF SOURCES LISTED)

- Abrasives:** Abrasives Co., Tacony & Fraley Sts., Philadelphia, Pa.
- Acme Mach:** Acme Machinery Co., 4553 St. Clair Ave., NE, Cleveland, O.
- Adel:** Adel Precision Products Corp., 10777 Van Owen, Burbank, Cal.
- Air Reduction:** Air Reduction Sales Co., 60 E. 42nd St., N. Y. City 17.
- AISC:** American Institute of Steel Construction, Dept. Educational Service, 101 Park Ave., N. Y. City 17.
- Allegheny Ludlum:** Allegheny Ludlum Steel Corp., Brackenridge, Pa.
- Allen:** Allen Equipment Co., Kalamazoo, Mich.
- Allis Chalmers:** Allis-Chalmers Manufacturing Co., 1126 S. 70th St., Milwaukee 1, Wisc.
- Aluminum Co.:** Aluminum Company of America, Motion Picture Dept., Gulf Bldg., Pittsburgh 19, Pa.
- Am Bra:** bury 88
- Am Soc** for Met
- Amco:** A N. Y. C
- America** Corp.,
- America** Manufa
- AMNH:** History
- Anaconc** Broadv
- Anthrac** Anthra
- Ave., 1**
- Armco:** Curtis.
- ASBE:** neers, Dept. of Visual Education, 208 3rd Ave., SE, Minneapolis 14, Minn.
- AT & T:** American Telephone & Telegraph Co., 195 Broadway, N. Y. City.
- Atlas:** Atlas Educational Film Co., Oak Park, Ill.
- B & H:** Bell & Howell Co., (Filmosound Division) 1301 W. Larchmont Ave., Chicago 13, Ill.
- Bailey:** Bailey Film Service, 1651 Cosmo St., Hollywood 28, Cal.
- Bakelite:** Bakelite Corp., (Unit of Union Carbide & Carbon) 30 E. 42nd St., N. Y.
- Ball Bros.:** Ball Brothers (Mason Jars) 9th & Macedonia, Muncie, Ind.
- Bausch & Lomb:** Bausch & Lomb Optical Co., 635 St. Paul, Rochester, N. Y.
- Behr Manning:** Behr-Manning Corp., Division Norton Co., Troy, N. Y.
- Bell Aircraft:** Bell Aircraft Corp., 2050 Elmwood Ave., Buffalo 7, N. Y.
- Bendix:** Bendix Aviation Corp., Fischer Bldg., Detroit, Mich.
- Bethlehem:** Bethlehem Steel Co., Bethlehem, Pa.
- B G Spark Plug:** B. G. Corp., 136 W. 52nd St., N. Y. City 19.
- BIS:** British Information Services, 30 Rockefeller Plaza, N. Y. City 20; 360 N. Michigan Ave., Chicago 1, Ill.; 391 Sutter St., San Francisco 8, Cal.; 1005 Taft Bldg., 1680 N. Vine St., Hollywood 28, Cal.; 1336 New York Ave., NW, Washington 5, D.C.; 1309 First National Bank Bldg., Atlanta 3, Ga.
- Boonton:** Boonton Molding Co., Film Office, 122 E. 42nd St., New York City.
- Boots:** Boots Aircraft Nut Corp., New
- Canadian Electric:** Canadian Electric Light & Power Co., Windsor Station, Montreal.
- Cannon Electric:** Cannon Electric Development Co., 3209 Humboldt, Los Angeles 31, Cal.
- Caravel:** Caravel Films, Inc., 730 5th Ave., N. Y. City.
- Carborundum:** Carborundum Co., Niagara Falls, N. Y.
- Castle:** Castle Films, Inc., contracting distributor for film sales of the U. S. Office of Education, Division of Visual Aids, Castle Films, Inc., 30 Rockefeller Plaza, N. Y. City 20. Branch offices at 135 S. La Salle St., Chicago, Ill., and Russ Bldg., San Francisco 4, Cal.
- Caterpillar:** Caterpillar Tractor Co., Peoria, Ill.

How to Get Supplemental INDEX References:

New listings, changes, etc. are published regularly in the pages of Business Screen Magazine by the Editors of the INDEX.

Use the Attached Subscription Order Form

Celanese: Celanese Plastics Corp., 180 Madison Ave., N. Y. City 16.

Champion: Champion Spark Plug Co., 904 Upton Ave., Toledo 1, O.

Chicago Tribune: Chicago Tribune, Public Service Bureau, 1 S. Dearborn St., Chicago, Ill.

Chrysler: Chrysler Corp., 311 Massachusetts Ave., Highland Park 31, Mich.

Cin Mill: Cincinnati Milling Machine, Marburg Ave., Cincinnati 9, O.

Cl Moly: Climax Molybdenum Co., 500 5th Ave., N. Y. City 18.

Cleveland: Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.

Cleveland Pneumatic: Cleveland Pneumatic Tool Co., 3781 E. 77th, Cleveland, O.

Cocking: Floyd W. Cocking, 4757 Constance Dr., San Diego, Cal.

College Film: College Film Center, 81 E. Randolph, Chicago 1, Ill.

Columbia Pictures: Columbia Pictures Corp., 729 7th Ave., N. Y. City 19.

Columbia Tool: Columbia Tool Steel Co., Chicago Heights, Ill.

Commercial: Commercial Films, 1800 E. 30th St., Cleveland, O.

Consolidated Aircraft: Consolidated Aircraft Corp., Lindbergh Field, San Diego, Cal.

Consolidated Vultee: Consolidated Vultee Aircraft Corp., San Diego, Cal.

Copeland & Thompson: Copeland & Thompson, Inc., 206 5th Ave., N. Y. C.

Copper: (See U. S. Bureau of Mines.)

Coronet: Coronet Productions, 919 North Michigan Ave., Chicago, Ill.

Crane: Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.

Curtiss-Wr.: Curtiss-Wright Corp., 30 Rockefeller Plaza, New York City 20.

Damrow: Damrow Brothers Co., Fond du Lac, Wisc.

Dartnell: Dartnell Corp., 4660 Ravenswood Ave., Chicago, Ill.

De Frenes: De Frenes & Co., 1909 Buttonwood St., Philadelphia, Pa.

De Vry: De Vry Films & Laboratories, 1111 Armitage Ave., Chicago 14, Ill.

Denver: Denver & Rio Grande Western Railroad, Rio Grande Bldg., Denver 1, Colo.

Detroit Board of Ed: Detroit Board of Education, Detroit, Mich.

Douglas: Douglas Aircraft Co., Inc., Industrial Training Dept., 3000 Ocean Park Blvd., Santa Monica, Cal.

Douglas Fir: Douglas Fir Plywood Assn., 301 Tacoma Bldg., Tacoma 2, Wash.

Dow: Dow Chemical Co., Midland, Mich.

Du Pont: E. I. Du Pont de Nemours Co., Wilmington 98, Delaware.

Du Pont Rayon: E. I. Du Pont de Nem-

SOURCES OF FILMS AVAILABLE

ours & Co., Rayon Division, Wilmington 98, Delaware.

Eastin: Eastin 16mm Pictures, 707 Putnam Bldg., Davenport, Ia.

EBFilms: Encyclopaedia Britannica Films, 20 North Wacker Drive, Chicago.

Edison: Thomas A. Edison, Inc., West Orange, N. J.

Edit PS: Edited Pictures System, 330 W. 42nd St., N. Y. City.

Elec Motor: Electric Motor Corp., 1211-1221 State, Racine, Wisc.

Elec Research: Sentinel Radio Corp., 2020 Ridge Ave., Evanston, Ill.

Electric Arc: Electric Arc Co., 152 Jelliff Ave., Newark, N. J.

Electro-Chemical Eng: Electro-Chemical Engineering Co., 114 Liberty St., N. Y. City.

Esso: Standard Oil Company of New Jersey, 26 Broadway, N. Y. City 4.

Fe Pr: Federal Products Corp., 1141 Eddy St., Providence 1, R. I.

Fi Pr: Film Production Co., 3650 N. Fremont Ave., Minneapolis, Minn.

Films: Films, Inc., 330 W. 42nd St., N. Y. City 18.

Films of Commerce: Films of Commerce, 21 W. 46th St., N. Y. City.

Fir Door Inst: Fir Door Institute, Tacoma Bldg., Tacoma 2, Wash.

Firestone: Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, O.

Florez: Florez, Inc., 815 Bates St., Detroit, Mich.

Ford: Ford Motor Co., 3000 Schaefer Rd., Dearborn, Mich.

Formica: Formica Insulation Co., 4614 Spring Grove, Cincinnati 32, O.

Franklin: Franklin Institute, 251 South 22nd St., Philadelphia 3, Pa.

Franz: Franz Baking Co., Portland, Ore.

Freeport: Freeport Sulphur Co., 122 E. 42nd St., N. Y. C. 17.

Fruit of the Loom: Fruit of the Loom Corp., 1450 Broadway, N. Y. City 18.

Fuller: Fuller Brush Co., 3580 Main, Hartford, Conn.

Fulton: The Fulton Sylphon Co., Knoxville 1, Tenn.

Gallen Kamp: (See SVE).

Ganz: W. J. Ganz, 19 E. 47th St., N. Y.

GE: General Electric Co., Visual Instruction Section, 1 River Road, Schenectady, N. Y. Branch Offices: 920 SW 6th Ave., Portland, Ore.; Department of Visual Instruction, U. of California, Berkeley, Cal.; 235 Montgomery St., San Francisco, Cal.; 212 N. Vignes St., Los Angeles, Cal.; 200 S. Main St., Salt Lake City, Utah; 650 17th St., Denver, Colo.; 1801 N. Lamont St., Dallas, Tex.; 4966 Woodland Ave., Cleveland, O.; 187 Spring St., NW, Atlanta, Ga.; 1405 Lo-

SOURCES OF FILMS AVAILABLE

- cust St., Philadelphia, Pa.; 570 Lexington Ave., N. Y. City; 140 Federal St., Boston, Mass.; 840 S. Canal, Chicago, Ill.
- Gen Tire:** General Tire & Rubber Co., Englewood Ave., Akron 9, O.
- Gisholt:** Gisholt Machine Co., 1245 E. Washington Ave., Madison 3, Wisc.
- Glatfelter:** P. H. Glatfelter Co., 1 Main, Spring Grove, Pa.
- GM:** General Motors Corp., Public Relations Dept., 1775 Broadway, N. Y. C.
- Goodyear:** Goodyear Tire & Rubber Co., Inc., 1144 E. Market, Akron, O.
- Gregg:** Gregg Publishing Co., 270 Madison Ave., N. Y. City.
- Griffin:** Griffin Wheel Co., 410 N. Michigan Ave., Chicago, Ill.
- Gutlohn:** Walter O. Gutlohn, Inc., Division of International Theatrical & Television Corp., 25 W. 45th St., N. Y. C.
- Har:** Harbinson-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.
- Harnischfeger:** Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14.
- Harvard:** Harvard Film Service, Cambridge, Mass.
- Harvill:** Harvill Corp., 6251 W. Century Blvd., Los Angeles, Cal.
- Haselton:** Guy D. Hazelton, 7936 Santa Monica Blvd., Hollywood 46, Cal.
- Hebert:** Hebert Studios, 55 Allyn, Hartford, Conn.
- Hercules:** Hercules Powder Co., Inc., Delaware Tr. Bldg., Wilmington 99, Delaware.
- Hills-McCanna:** Hills McCanna Co., 3025 N. Western, Chicago, Ill.
- Homasote:** Homasote Co., Trenton, N. J.
- Howard:** Howard Clothes, Inc., 170 Tillary, Brooklyn, N. Y.
- Ideal:** Ideal Pictures Corporation, 28 E. 8th St., Chicago, Ill.
- Ill Tech:** Illinois Institute of Technology, 3300 Federal, Chicago 16, Ill.
- Illuminating Eng Soc:** Illuminating Engineering Society, 51 Madison Ave., N. Y. City 10.
- Ind U:** Indiana University, Director of Extension Services, Bloomington, Ind.
- Interstate Oil:** Interstate Oil Compact Commission, Box 3185, State Capitol, Oklahoma City, Okla.
- Int'l Acet:** International Acetylene Association, 30 E. 42nd St., N. Y. City 17.
- Int'l Harvester:** International Harvester Co., 180 N. Michigan Ave., Chicago 1.
- Int'l Nickel:** International Nickel Co., Inc., 67 Wall, N. Y. City 5.
- Iowa State:** Iowa State College, Visual Instruction Service, Ames, Ia.
- Jam Handy:** The Jam Handy Organization, 2900 E. Grand Blvd., Detroit 11.
- Jenkins:** Jenkins Brothers, Inc., 80 White St., N. Y. City 13.
- Johns-M:** Johns-Manville, 22 E. 40th at Madison Ave., N. Y. City 16.
- Jones & Lamson:** Jones & Lamson Machine Co., Springfield, Vt.
- Kearney:** Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisc.
- Kerr:** Kerr Glass Manufacturing Corp., 433 S. Spring, Los Angeles 13, Cal.
- Knaus:** Frank Knaus, 2113 Parkside Ave., Los Angeles, Cal.
- Knowledge:** Knowledge Builders Classroom Films, 130 W. 46th St., N. Y. C.
- Kodak:** Eastman Kodak Co., 343 State, Rochester 4, N. Y.
- Lennox:** Lennox Pottery, Inc., Trenton 5, N. J.
- Lincoln Electric:** Lincoln Electric Co., 12818 Coit Rd., Cleveland 13, O.
- Lindberg:** Lindberg Engineering Co., 2450 Hubbard St., Chicago 12, Ill.
- Linde:** Linde Air Products Co., 30 E. 42nd St., N. Y. City.
- Lockheed:** Lockheed Aircraft Corp., Promotion Dept., 1705 Victory Place, Burbank, Cal.
- Lukens:** Lukens Steel Co., 73 S. 1st Ave., Coatesville, Pa.
- Mac Veagh:** Modern Talking Picture Service, 9 Rockefeller Plaza, N. Y. City.
- McFarland:** R. B. MacFarland & Associates, 520 N. Michigan Ave., Chicago.
- Mahogany:** Mahogany Association, Inc., 75 E. Wacker Dr., Chicago 1, Ill.
- Mallinckrodt:** Mallinckrodt Chemical Works, 2nd & Mallinckrodt Sts., St. Louis, Mo.
- Mario:** Mario Manufacturing Co., 390 4th Ave., N. Y. City.
- MIT:** Massachusetts Institute of Technology, Division of Visual Education, Cambridge, Mass.
- Mechanical Brick:** Mechanical Brick-handling Corp., P. O. Box 239, Lancaster, Pa.
- Meehanite:** Meehanite Research Inst. of America, Pershing Bldg., New Rochelle, N. Y.
- Methods:** Methods Engineering Council, Wood & Franklin Sts., Pittsburgh, Pa.
- Micro Switch:** Micro Switch Division of First Industrial Corp., 205 S. Chicago Ave., Freeport, Ill.
- Micromatic:** Micromatic Hone Corp., 3100 Schoolcraft Ave., Detroit 4, Mich.
- Midwest Rubber:** Midwest Rubber Reclaiming Co., East St. Louis, Ill.
- Modern:** Modern Talking Picture Service, Inc., 9 Rockefeller Plaza, N. Y. C.
- Monarch Machine:** Monarch Machine Tool Co., Sydney, O.
- Murray:** Murray Corp. of America, 7700 Russell, Detroit 11, Mich.

N American Aviation: North American Aviation, Inc., 5701 Imperial Highway, Inglewood, Cal.

NAM: National Association of Manufacturers, 14 W. 49th St., N. Y. City 20.

Nat'l Carbon: National Carbon Co., Inc., 30 E. 42nd St., N. Y. City 17.

Nat'l Machinery: National Machinery Co., 565 W. Washington, Chicago, Ill.

Nat'l Safety: National Safety Council, 20 N. Wacker Dr., Chicago, Ill.

Nat'l Tube: National Tube Co., Frick Bldg., Pittsburgh 30, Pa.

Navy: (See Castle Films.)

New York: New York, New Haven & Hartford Railroad, S. Station, Boston.

NFBC: National Film Board of Canada, 84 E. Randolph St., Chicago 1, Ill.

N J Zinc: New Jersey Zinc Co., 160 Front, N. Y. City 7.

Norfolk RR: Norfolk & Western Railway Co., Roanoke, Va.

Norton: Norton Co., 1 New Bond, Worcester 6, Mass.

N Y Central: New York Central System, Motion Picture Bureau, 230 Park Ave., N. Y. City 17.

NYU: New York University, College of Engineering, University Heights, N. Y.

OIAA: U. S. Department of State, Motion Picture Project, Domestic Distribution, 35 W. 45th St., N. Y. City.

Owens-Ill: Owens-Illinois Glass Co., Ohio Bldg., Toledo 1, O.

OWI: Office of War Information, Official agency discontinued but films remain on deposit in 300 commercial and educational film libraries.

Packard: Packard Motor Car Co., 1580 E. Grand Blvd., Detroit 32, Mich.

Penn State: Pennsylvania State College, Central Extension Office, State College, Pa.

Perfect Circle: Perfect Circle Co., S. Washington, Hagerstown, Ind.

Ph Dodge: Phelps-Dodge Refining Corp., 40 Wall St., N. Y. City 5.

Pict Films: Pictorial Films, Inc., RKO Building, N. Y. City 20.

Pioneer: Pioneer Parachute Co., Manchester, Conn.

Pittsburgh: Pittsburgh Plate Glass Co., 2200 Grant Bldg., Pittsburgh 19, Pa.

Plomb Tool: Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles 54, Cal.

Portland Cement: Portland Cement Association, 33 W. Grand Ave., Chicago.

Pratt & Whitney: Pratt & Whitney Aircraft Division, United Aircraft Corp., E. Hartford 3, Conn.

Princeton: Princeton Film Center, 55 Mountain Ave., Princeton, N. J.

Purdue U: Purdue University, General Engineering Dept., Lafayette, Ind.

SOURCES OF FILMS AVAILABLE

Purinton: Robert F. Purinton, 4404 42nd St., San Diego, Cal.

Purolator: Purolator Products, Inc., 365 Freylinghuysen Ave., Newark 5, N. J.

Quimby: Quimby Pump Co., 340 Thomas St., Newark, N. J.

RCA: Radio Corporation of America, Front & Cooper Sts., Camden, N. J.

Rep Steel: Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.

RFA: Religious Film Association, Inc., 297 4th Ave., N. Y. City 10.

RKO Pict Films: Pictorial Films, Inc., RKO Bldg., N. Y. City 20.

Roebbling's Sons: John A. Roebbling's Sons Co., 640 S. Broad, Trenton, N. J.

Rohm & Haas: Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.

Rolab: Rolab Photo Service Laboratories, Sandy Hook, Conn.

Ross Roy: Ross Roy, 2751 E. Jefferson Ave., Detroit, Mich.

Rothacker: Douglas D. Rothacker, 729 7th Ave., N. Y. City 19.

Ruberoid: The Ruberoid Co., 500 5th Ave., N. Y. City 18.

S Bend Lathe: South Bend Lathe Works, 425 E. Madison, South Bend 22, Ind.

Saginaw: Saginaw Steering Gear Division, General Motors, Saginaw, Mich.

Santa Fe: Santa Fe Railway, 80 E. Jackson Blvd., Chicago, Ill.

Sazin: Henry Sazin, 723 7th Ave., N. Y.

Scintilla: Scintilla Magneto Division, Bendix Aviation Corp., Sydney, N. Y.

Sd Masters: Sound Masters, Inc., 165 W. 46th St., New York City.

Service Engraving: Service Engraving Co., 85 W. Canfield Ave., Detroit, Mich.

Shell: Shell Oil Co., 50 W. 50th St., N. Y. 100 Bush, San Francisco 6, Calif.

Sinclair: Sinclair Refining Co., Merchandising Manager, 630 5th Ave., N. Y.

Socony: Socony Vacuum Co., 26 Broadway, N. Y. C. 4.

Solow: Sidney Paul Solow, c/o Consolidated Film Industries, Hollywood, Cal.

Sperry: Sperry Gyroscope Co., Inc., Central Film Service, Great Neck, L. I., N. Y.

St. Joseph: St. Joseph Lead Co., 250 Park Ave., N. Y. City 17.

Standard Knapp: Standard Knapp Corp., 221 N. La. Salle, Chicago 1, Ill.

Standard Machinery: Standard Machinery Co., Providence, R. I.

Standard Oil: Standard Oil Company of Indiana, 910 S. Michigan Ave., Chicago 80, Ill.

Sun Oil: Sun Oil Co., Sales Promotion Dept., 1608 Walnut St., Philadelphia 3.

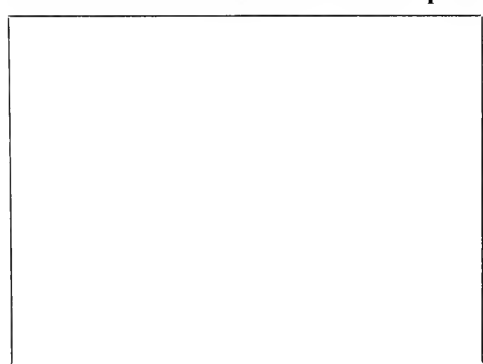
Superheater: Superheater Co., 60 E. 42nd St., N. Y. City 17.

SVE: Society for Visual Education, 100

SOURCES OF FILMS AVAILABLE

- E. Ohio St., Chicago 11, Ill.
- Tanners:** Tanners Council of America, 100 Gold St., N. Y. City 7.
- Texaco:** Texaco Co., 135 E. 42nd St., N. Y. City 17.
- Texas Gulf:** Texas Gulf Sulphur Co. (See USBM).
- Thermoid:** Thermoid Rubber Co., 200 Whitehead Rd., Trenton 6, N. J.
- Thompson:** Thompson Products, Inc., Aircraft Accessories Division, 2196 Clarkwood Rd., Cleveland 3, O.
- Timken:** Timken Roller Bearing Co., Canton, O.
- Tradefilms:** Tradefilms, Inc., 666 N. Robertson Blvd., Hollywood 46, Cal.
- TVA:** Tennessee Valley Authority, Knoxville, Tenn.
- U of Cal:** University of California, Dept. of Visual Instruction, Extension Division, Berkeley 4, Cal.
- U of Ia:** University of Iowa, Visual Education Bureau, Iowa City, Ia.
- U of Ill:** University of Illinois, Visual Aids Service, Urbana, Ill.
- U of Kan:** University of Kansas, Bureau of Visual Instruction, Lawrence, Kan.
- U of Minn:** University of Minnesota, Extension Dept., Minneapolis 13, Minn.
- U of So Cal:** University of Southern California, University Park, Los Angeles, Cal.
- U of Texas:** University of Texas, Visual Instruction Bureau, Division of Extension, Austin 12, Texas.
- U of Wisc:** University of Wisconsin Extension Service, Madison 6, Wisc.
- U Wire Rope:** Union Wire Rope Corp., 21st & Manchester Ave., Kansas City 3, Mo.
- United Aircraft:** United Aircraft Corp., E. Hartford 8, Conn.
- US Elec Motor:** U. S. Electrical Motor, 1500 S. Western Ave., Chicago, Ill.
- US Rubber:** U. S. Rubber Co., 1230 6th Ave., N. Y. City 20.
- US Steel:** U. S. Steel Corporation of Delaware, 436 7th Ave., Pittsburgh 30, Pa. Branch Offices: Birmingham Film Distribution Center, Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham 2, Ala.; Chicago Film Distribution Center, U. S. Steel Subsidiary, 208 S. La Salle St., Chicago, Ill.; Cleveland Film Distribution Center, American Steel & Wire Co., Rockefeller Bldg., Cleveland 13, O.; New York Film Distribution Center, U. S. Steel Corporation of Delaware, 71 Broadway, N. Y. City 6; San Francisco Film Distribution Center, Columbia Steel Co., Russ Bldg., San Francisco 6, Cal.
- USBM:** U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.
- USDA:** U. S. Department of Agriculture, Motion Picture Division, Wash., D. C.
- USDL:** U. S. Department of Labor, Division of Labor Standards, Washington, D.C.
- USOE:** U. S. Office of Education, 1230 Tempo M Bldg., Washington 25, D. C. (See also Castle Films, Inc.)
- Venard:** C. L. Venard, The Venard Organization, Peoria 2, Ill.
- Veneer:** Veneer Association, 616 S. Michigan Ave., Chicago 5, Ill.
- Vermont Marble:** Vermont Marble Co., Proctor, Vt.
- Vis Lib:** Visual Library, 1600 Broadway, N. Y. City.
- Vis Sci:** Visual Sciences, Suffern, N. Y.
- Viscose:** Viscose Co., 140 N. Dearborn, Chicago 2, Ill.
- Vocafilm:** Vocafilm Corp., 424 Madison Ave., N. Y. City.
- Voca Guidance:** Vocational Guidance Films, Inc., 2713 Beaver Ave., Des Moines, Ia.
- Vulcan:** Vulcan-Crucible Steel Co., West Aliquippa, Pa.
- Warner:** Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.
- West Elec:** Western Electric Co., 195 Broadway, N. Y. City 7.
- Westinghouse:** Westinghouse, 306 Fourth Ave., P. O. Box 1017, Pittsburgh 30, Pa.
- Weyerhaeuser:** Weyerhaeuser Sales Co., First National Bank Bldg., St. Paul 1.
- Willard:** Willard Storage Battery Co., 246 E. 131st St., Cleveland 1, O.
- Wolff:** Raphael G. Wolff, Inc., 1714 N. Wilton Place, Hollywood 28, Cal.
- Wright:** Wright Aeronautical Corp., 132 Beckwith Ave., Patterson 3, N. J.
- Yarway:** Yarway Waring Co., 102 E. Mermaid Lane, Philadelphia 18, Pa.
- YMCA:** YMCA Motion Picture Bureau, 347 Madison Ave., N. Y. City; 19 S. La Salle St., Chicago, Ill.; 351 Turk St., San Francisco, Cal.; 1700 Patterson St., Dallas, Tex.
- Young America:** Young America Film Divisions, 32 E. 57th St., N. Y. City 22.

Paste Additional Sources In this Space



Aviation Industry

AERODYNAMICS

MOTION PICTURES

Aerodynamics: Air Flow. (18 min) 1911. 16sd-\$16.98. AAF-Castle. TFI-160.

Shows, through the use of smoke, the flow of air around airfoils. Skin friction, streamlining and the trend in design toward high speed airfoils, the use of wing flaps and their design, and the effect of ice on leading edges are shown.

Aerodynamics: Forces Acting on an Airfoil. (27 min) 1941. 16sd-\$24.92. AAF-Castle. TFI-161.

Depicts the theory and principle of the forces acting on airfoils. Relative wing, lift, drag, angle of attack, and the airfoil itself are defined and their relationship illustrated. This film should be used as a component reel and be shown previous to *Aerodynamics: Air Flow*.

Aerodynamics.—Part 1: Properties of Air. (10 min) 1942. 16sd-\$35; rent-\$2. Bray.

Demonstration of air having enough mass to support objects; demonstration of weight of air.

Aerodynamics.—Part 2: Lift. (10 min) 1942. 16sd-\$35; rent-\$2. Bray.

Demonstrates Bernoulli's principle and its application to lift. Kite versus airplane flight compared in a wind tunnel; other lift experiments.

Aerodynamics.—Part 3: Air Resistance and Streamlining. (11 min) 1942. 16sd-\$35; rent-\$2. Bray.

Resistance of air to moving objects; visible air flow, using apparatus creating white vapor from dry ice.

Aerodynamics: Theory of Flight. (11 min) 16sd-\$50. EBFilms.

A wind tunnel demonstration of air velocity showing lift and drag on plain and cambered airfoils. Also the control of airplane movement by use of ailerons, elevator and rudder.

Age of Flight. (20 min) 16sd. RKO-Pict Films.

Progress of aviation from Kitty Hawk to mass production of today.

Air. (15 min) 16si-rental plus transportation. EditPS.

Measuring of velocity of wind; air pressure principles, principles of compression as applied to airplane and parachute, lighter-than-air ships, submarines.

Air Currents and Theory of Streamlining. (12 min) 1937. 16sd-\$27; rent-\$1.50. Gntlohn.

Shows by means of objects suspended in a wind tunnel, the reaction of air currents to differently shaped objects.

Aircraft and How They Fly. (11 min) 1943. 16sd-\$45; rent-\$2. Bray.

Lighter-than-air craft, amphibians, autogiros, and helicopters illustrated.

Airplane & Its Parts, The. (30 min) 16sd. Tradefilms.

Functions of various parts of an airplane with explanation of why airplane flies.

Atmosphere and Its Circulation. (11 min) 16sd. EBFilms.

First is presented the nature of air, structure, chemical composition, weight and distribution. Second, the circulation in relation to the earth; that circulation forms pressure bands and is affected by rotation which causes movement or winds. The structure and dynamics of atmosphere are explained by animated drawings.

Atmospheric Pressure. (15 min) 1928. 16si-\$21. EBFilms.

Illustrations of unbalanced air pressure including Magdeburg hemisphere demonstrations. Variations in atmospheric pressure between valley and hilltop and between land and water.

Conquest of the Air. (40 min) 16sd. Films.

Every significant development in aviation from Leonardo daVinci's sketches to modern clippers.

Methods of Flight. (20 min) 16sd. Bray.

How man seeks to apply principles of bird flight to aircraft; ornithopter, gliders, balloons, helicopter, rocket ship.

Motions of a Plane. (10 min) 16sd. Bray.

Three fundamental motions; how each is made.

Smoke Streams. (30 min) 16si-\$90; rent-\$4. Franklin Institute-Bray.

A visualized study of aerodynamics and air-flow phenomena. Shows: lift, drag, high lift devices, downwash effects, tip losses, and miscellaneous flow phenomena.

Youth Takes to Wings. (40 min) 16sd. Bray.

Demonstrate flight theory, development, and engine principles.

SLIDE FILMS

Aerodynamics. AAF-Castle. FS1-8.

Describes the motion of air and the force it exerts upon moving solids; explains the way in which turbulence and skin friction oppose useful dynamic reaction.

Aerology: Ice Formation on Aircraft. (48 min) 16sd-\$42.66. Navy-Castle. MN119a.

How ice forms on an aircraft and the effect it has on the flyability of the plane.

Atmosphere & the Airfoil, The. (Theory of Flight Series—Part I) \$2. SVE.



A Scene from "Youth Takes to Wings."

Control of the Plane. (Theory of Flight Series—Part III) \$2. SVE.

Effect of Controls. AAF-Castle. FS1-98.

A filmstrip for use with elementary aviation pilots and instructors describing function of basic controls and what happens when each is used. Explains coordination of controls and stresses the elimination of "manhandling" controls.

Lift & Drag. (92 frames) Jam Handy.

One of the Pilot Training Kit, dealing with pressure on an airfoil, and airfoil characteristics.

Plane Performance. (112 frames) Jam Handy.

One of the Pilot Training Kit films, dealing with the effects of power loading, load factor control, and structure of the plane for dynamic loads.

Stability & Performance. (Theory of Flight Series—Part IV) \$2. SVE.

Wing Forces. (88 frames) Jam Handy.

One of the Pilot Training Kit films, dealing with lift, weight, thrust, and drag acting on the airplane; balance, and control surfaces.

AIRCRAFT ENGINEERING

(See also *Engineering*, p. 37)

MOTION PICTURES

Airplane Structures: Static Test. (12 min) 1942. 16sd-\$10.84. AAF-Castle. TF1-312.

Shows laboratory methods used to test various component parts and control columns of aircraft submitted for checking against original specifications and design.

Airplane Structures: Structural Units, Materials and Loads for Which Designed. (8 min) 1941. 16sd-\$6.81. AAF-Castle. TF1-211.

Describes the four structural units of the airplane: fuselage, wings, control surfaces and landing gear. Discusses the positive and negative loads which each must withstand.

Design For Flying. (18 min) 16sd. Douglas.

Picture provides orientation for beginners in aircraft plant engineering department. Traces, step by step, engineers' work from initial design, through aerodynamics, wind tunnel models, drafting and blueprinting. Work of flight test engineers and liaison engineers included.

Essential Parts and Types of Planes. (15 min) 1941. 16sd-\$45; rent-\$2. Bray.

(Part of *Youth Takes to Wings*). Demonstration, with models, of the functions of fuselages, wings, tail surfaces, and rudders in controlling stability in flight.

Making a Master Developed Layout: Part I. (20 min) 16sd-\$27.09. USOE-Castle. OE126.

Shows how to make the complete pattern or master developed layout (except layout of form block line) for a bulkhead in an airplane fin, using a master contour template; how to provide bend relief; how to calculate setback values;

how to use dividers to scribe lines and transfer measurements.

Making a Master Developed Layout: Part II and Making a Form Block. (16 min) 16sd-\$23.35. USOE-Castle. OE127.

Shows how to complete a master developed layout by calculating and scribing the form block lines. Shows how to use the form block template to scribe contours and to locate beam lines, lightening hole, and pinholes on form block stock; how to saw, sand, and finish the form block to correct dimensions; how to check bevel angles and bend radius; and how to drill pin holes, and drill and countersink lightening hole.

Making of an Airplane Fitting. (20 min) 16si-\$48. Gutlohn.

Shows the drawing of a design for an airplane part, completing the blueprint and transferring it to the metal, the use of the scriber, fitting the part into place, machinery and tools necessary to make fitting.

SLIDE FILMS

Aircraft Nomenclature—Part I: Parts of the Airplane. Navy-Castle. SN60a.

Shows how the wings, engines and landing gear may be used to classify the airplane. Shows the various types of naval aircraft and gives the basic nomenclature of a Navy trainer and its power plant.

Airplane & Its Parts, The. (146 frames) sd. Tradefilms.

Produced by AWPC to acquaint new aircraft workers with aircraft terminology. It illustrates the five main assemblies of any airplane—the wing, fuselage, empennage, power plant, and landing gear, and also shows models and types of planes made by the eight member companies.

Complete Airplane, The. (Theory of Flight Series—Part II) \$2. SVE.

Construction of an Airfoil Template. Navy-Castle. SN289.

Shows how the Clark "Y" airfoil with a 60° chord is laid out. Tables are used for obtaining measurements, paper is secured to a drawing board, a base line and perpendiculars are drawn, the shape of the airfoil is made and a metal template is made from this pattern.

Preserve the Original Strength. Navy-Castle. SN294.

Stresses the fact that an airplane is as safe as the strength of its weakest point, explains tension, compression, shear, bending and torsion, explains the monocoque and semi-monocoque types of fuselages and the "stressed" skin type of wing structure.

Pressure Gages. AAF-Castle. FS1-52.

Application of pressure gages on aircraft. Illustrates Bourdon mechanism, diaphragm mechanism, and aneroid mechanism.

Structural Units of the Airplane. AAF-Castle. FS1-16.

Illustrates the basic structural units of the airplane: fuselage, engine mount, wings, stabilizer, cowlings, and fairing. Shows internal construction of various units, and different types of construction.

AIRCRAFT POWER PLANT

(See also *Engines*, p. 41)

Principles

MOTION PICTURES

Aircraft Engines—Types, Mechanisms and Oiling Systems. (35 min) 16sd. Castle.

Principles of the operation of the internal combustion engine. Pictures standard forms, cylinders arranged in a line, opposing, in a V, in a circle, radial. Cut-away models used.

SLIDE FILMS

Airplane Engine. (62 frames) si. Jam Handy.

Elementary principles of the four-stroke cycle internal-combustion engine; the cylinder, piston, and crankshaft; valve timing.

Classification of Engine Types. AAF-Castle. FS1-9.

Depicts the methods of classifying aircraft engines as to type: in-line, V-type, double V-type, X-type opposed, radial; and according to cubic inch displacement.

Assembly & Disassembly

MOTION PICTURES

Aviation Engine Disassembly & Inspection. (30 min) 16sd-\$90; si-\$72; rent-sd-\$5; si-\$3. Brandon.

Illustrates the major parts of a modern radial engine; the various sub-assemblies and their functions; methods of inspecting for flaws, testing and running in.

Disassembling the Engine. (13 min) 16sd-\$19.21. USOE-Castle. OE268.

Shows how to remove the oil sump, valve tappet, and gear case cover assemblies; how to separate crankcase and remove crankshaft assembly and camshaft; and how to disassemble crankshaft and gearcase cover assemblies.

Engine Change: Installation. (17 min) 16sd-\$23.98. USOE-Castle. OE273.

Shows the safety precautions to be observed when installing an engine; how to inspect engine mount, controls, and firewall; how to connect controls and attachments; how to ground test the engine; and how to prepare for check flight.

Engine Change: Removal. (17 min) 16sd-\$23.98. USOE-Castle. OE272.

Shows the safety precautions to be observed when removing an engine; how to disconnect controls and attachments; how to remove the engine; how to inspect the mount, firewall and controls.

Power by Wright. (50 min) 16sd. Wright.

Production of Wright air-cooled engines.

Reassembling the Engine. (22 min) 16sd-\$28.95. USOE-Castle. OE271.

Shows how to reassemble the crankshaft and camshaft assemblies, crankcase section, and gear case cover assembly; how to reinstall the oil sump; and how to complete reassembly of the engine.



Reassembling the Engine

Removing and Inspecting Cylinders. (18 min) 16sd-\$25.22. USOE-Castle. OE262.

Shows how to prepare for overhaul; how to remove the cylinder assemblies from the engine; how to disassemble the cylinder assemblies; how to clean, inspect, and recondition the cylinders; and how to measure clearances.

Wings for Defense. (10 min) 16sd. GM.

Manufacture and test of the Allison liquid cooled aircraft engine.

Wright Builds for Air Supremacy. 16sd. Curtiss-Wr.

Production of Wright air-cooled engines. Short version of "Power by Wright."

SLIDE FILMS

Connecting Rods, Crankshafts, Bearings, & Crankcases. AAF-Castle. FS1-35.

Describes purpose, essential parts, and means of disassembling and assembling connecting rods, crankshafts, bearings and crankcases.

Gaskets. (105 frames) si. Jam Handy.

Gives definition, uses, and examples of gaskets, methods of preparing surfaces for gaskets, and precautions to follow in fitting gaskets. Shows making of gasket patterns, and cutting of gaskets.

Electrical System

MOTION PICTURES

Aircraft Engines: Elements of Electricity as Applied to Ignition Systems. (28 min) 16sd-\$25.50. AAF-Castle. TF1-136.

Portrays elementary phenomena in electricity and magnetism and the application of these principles to the engine's ignition system.

Double Wasp Magneto & Its Timing. (14 min) 1943. 16sd-color-\$60; B & W-\$20. Pratt & Whitney.

R-2800 engine ignition system operation and the method of ignition timing.

Ignition System of the Wright Cyclone 18. (80 min) Wright.

Instructional film for pilots and ground crews on operation, servicing and maintenance of Wright Cyclone Engines.

Servicing & Timing Magnetos. (16 min) 16sd-\$23.35. USOE-Castle. OE266.

Shows how to remove magnetos from the engine, and install and adjust new points; explains the importance of ignition timing; and shows how to reinstall and time the magnetos.

Servicing Spark Plugs & Ignition Wiring. (22 min) 16sd-\$28.95. USOE-Castle. OE265.

Shows how to remove the spark plugs and ignition wires; how to clean, inspect, and adjust spark plugs; how to prepare new ignition wires for installation; and how to reinstall the spark plugs and ignition wires.

Servicing the Aviation Spark Plug. (25 min) 16sd-\$22.61. AAF-Castle. TFI-566.

Pictures the parts of an aviation spark plug and the proper way of installing, removing, cleaning, and adjusting it.

Spark Plugs in Aviation. (30 min) 1941. 16sd-rent-\$3. B. G. Corporation—Bray.

This film describes by animation and narration the practices and procedures for the servicing of aviation spark plugs, and also includes a description of the theory and operation of the Ignition Harness Test Set, which is used in the field to determine the condition of ignition wires, terminal sleeves, etc.

Trouble Shooting Problems—Ignition. (19 min) 16sd-\$25.85. USOE-Castle. OE275.

Shows how to find what system of the engine is causing trouble; how to locate trouble within the ignition system when an engine fails to start, when it runs rough, and when it fails to develop full power; how to repair and check engine operation after trouble shooting.

S L I D E F I L M S

Aircraft Storage Batteries. AAF-Castle. FS1-17.

Describes types of batteries used on airplanes, and their operating principles. Explains function of container, plates, separators, electrolyte, vents and terminals. Describes methods of charging and testing.

Airplane Ignition. (75 frames) si. Jam Handy.

Shows the function of the ignition system in a gasoline engine, the parts of the system and the purpose of each part, including magneto, ignition coil, condenser, distributor, breaker points, and spark plugs. A short sequence on engine lubrication completes the film.

Generator & Regulator Systems: Principles. AAF-Castle. FS1-53.

Explains the principles, operation, and construction of the generator and gives details of the various inspections required on generator and regulator systems: daily, 25, 50, 100-hour, and special inspections.

Fuel System

MOTION PICTURES

Aircraft Engines: Carburetion. (37 min) 16sd-\$33.31. AAF-Castle. TFI-137.

Shows, by means of animated drawings, various types of carburetors and the principles of operation with airplane engines.

Fuel Booster Pump, The. (12 min) 1943. 16sd-color. Thompson.

Explains how vapor locks occur at high altitudes and how the booster pump corrects them. Gives details of construction and maintenance of the pump.

Overhauling the Carburetor. (23 min) 16sd-\$30.05. USOE-Castle. OE267.

Shows how to remove the carburetor assembly from the engine; how to disassemble, clean and inspect, and reassemble the carburetor; how to check the fuel level; and how to reinstall the carburetor assembly.

Trouble Shooting Problems—Fuel Induction. (16 min) 16sd-\$23.35. USOE-Castle. OE276.

Shows how to find what system of the engine is causing trouble and how to locate the trouble within the system; how to trouble shoot in the fuel system for failure to develop full power, for rough running at idling speed, and for overheating; and how to check engine operation after trouble shooting.

Vapor Lock. (24 min) 1943. 16si. Thompson.

Shows vapor lock as it occurs in glass lines at various simulated altitudes, temperatures and rates of flow. Illustrates method of sampling to determine relative amounts of vapor.

S L I D E F I L M S

Aircraft Engine Pumps. AAF-Castle. FS1-60.

The operations, construction and maintenance of the coolant, oil and fuel pumps, and various types of vacuum pumps are shown. Explains the relief valve.

Exhaust & Intake Manifolds: Ranger. Navy-Castle. SN1323.

Shows how to remove, inspect and install exhaust and intake manifolds on the Ranger engine.

Exhaust & Intake Manifolds: Whirlwind. Navy-Castle. SN1324.

Shows how to remove, inspect, and install exhaust and intake manifolds on the Whirlwind engine.

Fuel & Feed. (87 frames) si. Jam Handy.

Principles of carburetion; carburetors; fuel injection; fuel feed systems.

Fuel & Oil Tank Repairs. Navy-Castle. SN2659.

Shows the tools needed for the job, and the proper method used in making fuel and oil tank repairs. Stresses the precautions to take when doing this type of work.

Fuel Level Gages. AAF-Castle. FS1-58.

Illustrates mechanical and electrical gages, their operating principles, methods of inspection and maintenance.

Inspecting the External Fuel System: Part I. Navy-Castle. SN187a.

Demonstrates the procedures recommended for cleaning and inspecting the entire external fuel system of the airplane.

Intake & Exhaust Systems. AAF-Castle. FS1-64.

Diagrams the essential elements of a simple intake and exhaust system; intake and exhaust systems for radial and V-type aircraft engines. Gives simplified explanation of the supercharger. Outlines maintenance and inspection procedures for intake and exhaust systems.

Servicing the Stromberg Carburetor. Silent slide film. Florez.

This film deals with the operation and servicing of the Stromberg carburetor.

Types of Fuel Systems. (76 frames) si. Jam Handy.

Shows mechanical- and gravity-type systems and the working principles of each; tanks, pumps, strainers, selector valves, fuel lines, and gages of the gravity systems; and various types of mechanical pressure systems. Emphasis is on Vane-pump type. Shows reliefs, hand or wobble pumps, by-pass valves, fuel units, how the system works, and why it is effective.

Inspection & Maintenance

MOTION PICTURES

Cooling System & The Fuel System, The. (22 min) 16sd-\$29.02. USOE-Castle. OE464.

Checking for leaks in cooling system; checking fan and water pump; checking mechanical operation of carburetor; cleaning filters and vents; checking fuel pump; checking for leakage in fuel system.

Double Wasp Daily & Preflight Inspections. (12 min) 1944. 16sd-color-\$55; B & W-\$15. Pratt & Whitney.

Complete daily and preflight checks of the R-2800 engine and associated systems.

Double Wasp Periodic Inspection. (25 min) 1944. 16sd-color-\$120; B & W-\$34. Pratt & Whitney.

Combined periodic inspections of the R-2800 engine and associated systems.

Field Inspection & Service of the Wright Cyclone 14. (80 min) Wright.

Instructional film for pilots and ground crews on the operation, servicing and maintenance of Wright cyclone engines.

Field Inspection & Service of the Wright Cyclone 18. (80 min) Wright.

Instructional film for pilots and ground crews on operation, servicing and maintenance of Wright cyclone engines.

Inspecting & Reconditioning Piston Assembly. (22 min) 16sd-\$28.95. USOE-Castle. OE263.

Shows how to clean, inspect, and recondition the piston assembly; how to measure clearances; and how to install new piston rings.

Inspecting & Reconditioning Valve Assembly. (25 min) 16sd-\$31.91. USOE-Castle. OE264.

Shows how to disassemble the valve mechanism and clean and recondition the parts; how to measure clearances; how to reassemble the valve mechanism; and how to re-install the pistons and cylinders.

Overhauling Camshaft Assembly & Crankcase Section. (19 min) 16sd-\$25.85. USOE-Castle. OE270.

Shows how to inspect the camshaft and gear case cover assembly parts; how to inspect and recondition the crankcase section; how to measure crankcase bearings; and how to inspect and recondition the remaining parts.

Overhauling Crankshaft Assembly. (19 min) 16sd-\$25.85. USOE-Castle. OE269.

Shows how to clean the parts of a disassembled engine; how to inspect and recondition crankshaft assembly parts; how to determine clearances and check for out-of-round; and how to check the clearances against specifications.

Servicing the Sodium-Cooled Aircraft Valve. (20 min) 16sd. Florez.

Contains technical animation as well as direct photography of service operation.

SLIDE FILMS

Aircraft Engine Troubles: General. AAF-Castle. FSI-66.

Describes common engine troubles in the compression and ignition systems; causes of improper compression; ignition troubles caused by defective spark plugs.

Cleaning the Power Plant. (42 frames). Jam Handy.

Demonstrates three reasons for keeping the power plant clean. Shows safety rules in operation, the selection of solvents and tools, inspecting before and after cleaning, cleaning cowling and disconnecting batteries, cleaning oil and fuel lines, cleaning and inspecting exhaust systems, cleaning and inspecting engine mounting, drying with air spray, and final inspection.

Cylinder & Piston Assemblies. AAF-Castle. FSI-27.

Technical details of cylinder and piston. Illustrates inspection of cylinder and piston defects, and use of thickness gage and micrometer.

Magneto—Ignition Maintenance. (43 frames) si. Jam Handy.

Shows the testing of spark plugs under pressure condition, materials, equipment, and tools necessary, preparation, procedure, observation of spark operation at stated pressures, preparing accepted plugs for storage, and clean-up after testing.

Maintenance of Storage Batteries. (55 pictures-51 frames) Jam Handy.

Propeller installation; periodic inspection and service; hydrometer check; electrolyte check; weather conditions affecting service; recharging procedure; storage at various temperatures.

Removing & Replacing Power Plant in F4F. Navy-Castle. SN253.

Outlines recommended procedures for removing and replacing the engine of the F4F. Emphasizes preparation, use of correct tools, and sequence of operations.



Overhauling Crankshaft Assembly

Removing, Cleaning & Replacing Cowl. Navy-Castle. SN166.

Illustrates methods of removal of common types of cowling. Shows types of cowling fasteners used, pointers on inspection and cleaning. Gives safety precautions to be observed.

Lubrication

MOTION PICTURES

Trouble Shooting Problems—Mechanical & Lubrication. (10 min) 16sd-\$16.73. USOE-Castle. OE274.

Shows how to find what part of the engine is causing trouble and the importance of checking obvious symptoms when trouble shooting; how to locate and correct causes of mechanical and lubrication trouble when the engine runs rough, and when there are low oil pressure and high oil temperature; and the importance of checking engine operation after trouble shooting.

SLIDE FILMS

Oil Systems. (69 frames) si. Jam Handy.

Shows how the oil systems work in V- and radial-type engines, and in wet- and dry-pump systems. Traces oil flow from tank through external and internal system, pointing out oil tanks, screen and self-cleaner type strainers, pressure-relief valves, pressure gages, oil-temperature regulators, oil lines, oil coolers, viscosity valves, and spring-loaded type valves. Closes by showing periodic oil-system check-up and how to trace simple oil-line failures.

Power Plant Lubrication. (36 frames) 1941. si. Jam Handy.

Types of equipment required and their uses. Types of oils and greases and their uses. Lubrication of an engine; each unit of the engine is discussed and specific lubricating directions for it are given.

Servicing the Oil System. (42 frames) si. Jam Handy.

Shows checking and indicates necessity of adding oil to capacity at all temperatures, choosing right oil, checking oil for water, recording oil added, and changing oil. Shows inspection of old oil and refilling with correct type of oil.

Operation

MOTION PICTURES

Power and Octane. (33 min) 1942. 16sd-loan only. Esso.

Describes what 100 octane gasoline is, and what it does for aircraft engines. Instructions for pilots on how to control its use in order to realize the full power of the fuel without harming the engine.

SLIDE FILMS

Aircraft Engine Operation. AAF-Castle. FS1-72.

Gives procedures for starting up, warming up, ground testing, and stopping aircraft engines. Illustrates operation under various flight conditions.

Aircraft Engine Troubles: Starting. AAF-Castle. FS1-82.

Aircraft engine starting difficulties are discussed under the heading of cold weather, carburetion, compression, ignition and starter.

Cold Weather Starting. Navy-Castle. SN144.

Describes the effects of cold weather on oil, grease, fuel line and spark plugs, and outlines a definite procedure for starting an airplane engine in cold weather. The use of the electric immersion heater and the canvas engine warmer is explained.

Methods of Starting. (43 frames) si. Jam Handy.

Shows various methods of starting the engine: By pulling the propeller, by choke cord, by direct hand crank, by combustion starter, by the inertia starter, and by direct electric starter; also shows preparing the engine for starting.

Tachometers & Synchronism Indicators. AAF-Castle. FS1-26.

Operating principles of aircraft tachometers, with inspection and maintenance procedures. Application of systems of synchronization with use of tachometers on multiple-engine installations.

Propellers

MOTION PICTURES

Aircraft Propellers—Hamilton Hydromatic Propeller—Theory & Operation. (15 min) 16sd-\$15.83. AAF-Castle. TF1-451.

A discussion of feathering and its advantages through the utilization of a variable pitch propeller. Models, diagrams, and actual views are combined to show the construction and mechanism of a variable pitch propeller. A discussion of constant speed operation. Ground checking and feathering in actual flight and in landing.

Airplane Propellers: Principles and Types. (17 min) 16sd-\$16.41. AAF-Castle. TF1-246.

Explains reasons for varying sizes and number of blades on different aircraft, why a propeller is twisted and why its angle is changed. Functions of fixed pitch, two-position, Hamilton Constant Speed, Hamilton Hydromatic, Curtiss Electric, and Aero Products propellers are shown.

Aircsrew, The. (22 min) 16sd. BIS.

An account of the manufacture of all-metal propellers, from the raw materials to the finished product. Includes explanation of the variable pitch theory.



Servicing a Propeller (see Page 15).

America First in the Air. (23 min) 16sd. Curtiss-Wr.

This production depicts the manufacture of airplane propellers in the Curtiss-Wright Aeroplane Division Plant at Caldwell, N. J.

Keep 'Em Flying. (30 min) 16sd. Hamilton Standard Propellers—Jam Handy.

The hydromatic propeller: models, diagrams, actual views of construction, and basic principles. Inspection and ground testing.

Servicing a Propeller. (18 min) 16sd-\$25.22. USOE-Castle. OE277.

Shows how to inspect and remove a propeller; how to repair damage to the metal edges; how to check the track and correct for out-of-track; how to check horizontal and vertical balance and correct for out-of-balance; and how to reinstall the propeller.

S L I D E F I L M S

General Principles of the Propeller. AAF-Castle. FS1-104.

Describes function and operation of the aircraft propeller. Explains thrust, pitch, angle, slip feathering, and wind-milling. Traces development of modern propeller.

Propeller Maintenance. (54 frames) si. Jam Handy.

Shows how different types are serviced. Illustrates cleaning, oiling, and inspection; field repairs; smoothing of nicks and gashes; etching for cracks; repairing bullet holes; and straightening of bent blades. Gives safety rules and shows propeller hub lubrication and checking for alignment.

Story of Aircraft Propellers, The. Navy-Castle. SN952.

Tells something of the history, nomenclature, and mechanics of aircraft propellers.

AIRCRAFT PRODUCTION

(See also *Foundry & Forging Practice*, p. 42; *Machine Shop*, p. 49; *Materials & Metals*, p. 60; & *Sheet Metal Shop*, p. 71)

Aircraft Alighting Gear

(See also *Aircraft Maintenance*, p. 20)

M O T I O N P I C T U R E S

Airplane Hydraulic Brakes: Principles of Operation. (20 min) 16sd-\$18.71. AAF-Castle. TFI-162.

Explains the need for brakes on modern airplanes and the basic principles of the brake itself. Covers both independent and integral systems in detail, including their operation in the airplane.

Airplane Hydraulic Brakes: Types, Construction and Action. (30 min) 16sd-\$27.22. AAF-Castle. TFI-305.

Displays the parts of the Bendix single servo and duo servo brakes, the Hayes single show, single servo and duo servo brakes, the Hayes single expander tube brakes, the Hayes double expander tube brakes and the Goodyear disc type brakes.

Airplane Hydraulic Systems: BC-1 Airplane. (15 min) 16sd-\$14.67. AAF-Castle. TFI-174.

Explains the basic principles of hydraulics, the operation of the hydraulic alighting gear and the complete BC-1 hydraulic systems as used in military airplanes to actuate alighting gear, flaps, and special accessories.

Airplane Streamline Tires. (20 min) 1937. 16si. Gen Tire.

Streamline tires in service, showing braking and taxiing characteristics, and how they affect the stability of the aircraft on the ground.

Airplane Structures: Alighting Gear. (10 min) 16sd-\$8.53. AAF-Castle. TFI-215.

Defines alighting gear; shows loads exerted; and explains principles of operation, component parts, and devices that warn pilots of alighting gear's position.

Cushioned Landings. (15 min) 16 & 35si. Goodyear.

With the use of a camera mounted under a plane's wing, a closeup study is made of a balloon tire's reactions on landings.

S L I D E F I L M S

Adjusting Hydraulic Brakes. Navy-Castle. SN181.

Demonstrates the fundamental operations involved in adjusting airplane hydraulic brakes and checking the hydraulic main cylinder, hydraulic lines and wheel cylinders.

Adjusting Mechanical Brakes. Navy-Castle. SN180.

Describes preliminary checking of the brake system, adjusting the brake and the final adjustments of the brake hook-up.

Aircraft Nomenclature—Part III: Floats and Hulls. Navy-Castle. SN60c.

Shows the construction of a pontoon, gives its nomenclature and explains the functions of its various parts. Demonstrates how a flying boat hull is divided into longitudinal and transverse bulkheads and names the various sections and parts of a hull.

Hydraulic Struts. (56 frames) si. Jam Handy.

Need, use, and function of hydraulic struts or shock absorbers; principles of operation and various types.

Outlines three conditions governing the friction that provides braking action. Shows the parts of an external contracting brake and explains the difference between hydraulic and mechanical brakes. Explains the theory of hydraulic mechanism and shows how the hydraulic system operates in an airplane.

Major Assemblies & Disassemblies: Part I. Navy-Castle. SN135a.

Straight photography and cartoons are used to show the assembling of the landing gear and tail wheel to the fuselage. Disassembly is not covered.

Aircraft Assembling.

Riveting and Welding

(See also *Welding*, p. 76)

M O T I O N P I C T U R E S

Airplane Riveting. (22 min) 16si-\$18; rent-\$3. Cutlohn.

The film shows the various air hammers and

bucking bars used in riveting, and explains the function of riveting and the necessity of teamwork and long practice. The primary three riveting projects are shown: roundhead riveting, flush riveting, and riveting of small rivets.

Aircraft Welding. (22 min) 1941. 16si-\$48; rent-\$3. Gutlohn.

Over all coverage of oxygen-acetylene welding in aviation mechanics. Shows actual welding operation on engine mount.

All Work and No Play. (30 min) 1944. 16sd. Boots-Modern.

Film shows the development of nuts and bolts from the early hand-forged one, to reusable nuts and bolts. Vibration tests show the nut that will not shake loose, the all metal out-of-phase nut.

Assembling in a Jig (Drilling and Riveting). (21 min) 16sd-\$27.71. USOE-Castle. OE137.

Shows the procedure for drilling, burring, dimpling, riveting an aircraft sheet metal assembly, emphasizing (1) following a pattern in drilling, (2) fastening parts securely before riveting, (3) riveting procedures for long and short seams.

Assembling in a Jig (Fitting and Lining Up). (16 min) 16sd-\$23.35. USOE-Castle. OE136.

Shows how aircraft sheet metal parts are assembled in a precision assembly jig, how aircraft sheet metal parts are fitted together and accurately lined up; how to use an awl for lining up; how to use skin fasteners; how to correct misaligned holes.

Blind Riveting. (15 min) 16sd-\$23.22. USOE-Castle. OE294.

Explains necessity for blind riveting. Shows how to rivet parts that have partial accessibility; how to rivet parts that are completely blind; how to determine when rivet heads are properly upset; how to use the special tools and rivets in blind riveting jobs.

Dimpling and Countersinking. (21 min) 16sd-\$27.71. USOE-Castle. OE139.

Shows how dimpling and countersinking prepare metal for flush riveting; how to set up and adjust a dimpling machine; how to operate a dimpling machine; how to select and adjust a stop counter-sink; how to countersink work for flush rivets.

Drilling With Portable Drill Motors. (17 min) 16sd-\$24.60. USOE-Castle. OE138.

Shows how to use a portable electric drill motor; how to select a drill and check it for size; how to insert a drill in chuck; how to check a drill for true running; how to avoid damage to parts while drilling; how to install and use a special attachment for drilling.

Driving and Bucking Rivets. (18 min) 16sd-\$25.22. USOE-Castle. OE140.

Shows how to set up and adjust a rivet gun; how to drive rivets under average conditions; how to buck rivets under average conditions; how a riveter and a bucker work together as a team; how to drive and buck rivets in hard-to-get-at places.

How to Rivet Aluminum. (27 min) 1942. 16sd. Aluminum in cooperation with USBM.

Shows assembly and fabrication of aluminum structures; preparing rivet holes, heating the rivets, riveting procedure.

Introduction to Airplane Riveting. (19 min) 1942. 16sd-\$66. Jam Handy.

Riveting in manufacture and maintenance of airplanes; types of rivets, storage, and heat treatment; spacing of rivets, laying out the work and drilling rivet holes; riveting operations.

Messerschmitt 110 E. (30 min) 16si-color. Consolidated Vultee.

Presents the assembly and disassembly of the German ME 110 presented to Vultee by the British Air Ministry. Made primarily to be shown to engineers and others interested in German construction methods.

Removing Defective Rivets. (15 min) 16sd-\$22.11. USOE-Castle. OE141.

Shows how an inspector marks defective rivets; how to center a drill in a rivet head; how to drill the heads of flush-type and brazier head rivets; how to draw a drill back on center; how to remove the shank and head after drilling.

Spot Welding. (19 min) 16sd-\$27.74. USOE-Castle. OE295.

Explains the machine, the making and testing of setups, making the spotweld, and cleaning the electrode tips.

Squeeze Riveting With Portable and Stationary Riveters. (14 min) 1945. 16sd-\$22.58. USOE-Castle. OE293.

Shows the advantages of riveting by machine; the selection of correct rivet sets for stationary and portable squeezers; the setup and use of the stationary and portable squeezers.

S L I D E F I L M S

Flush & Blind Riveting. Navy-Castle. SN298.

Describes the methods of countersinking rivets, the tools used, the circumstances determining the kind of dimpling to use, how riveting is done, the use of fixed gages in checking rivets, and precautions to be observed in blind riveting. Both diagrams and straight photography are employed.

Major Assemblies & Disassemblies: Part II. Navy-Castle. SN135b.

Specific directions for the assembly of the center, the wing and tail empennage of a biplane are given. Fastening of electrical and bonding connections and use of chafing gear is emphasized.

Making & Drilling Riveted Patch—Hand & Pneumatic Riveting—Removing Rivets. (68 pictures-62 frames) Jam Handy.

Laying out and making patches; use of straight shears; drilling patches; use of machine screws and rivet clamps; hand riveting; pneumatic riveters; removing rivets.

Riveting—Part I: Drilling. (106 frames) sd. Tradefilms.

Step-by-step description of airplane riveting procedure, with diagrams of tools.

Riveting—Part II: Gun Riveting & Bucking. (128 frames) sd. Tradefilms.

Working out of a formula for width and height of upset heads, with examples of procedure in an aircraft factory; use of various types of bucking bars; description of how to read riveting directions on a blueprint.

Riveting—Part III: Flush Riveting. (98 frames) sd. Tradefilms.

Shows the use of flush head riveting in streamlining airplanes, and demonstrates the flush head rivet set and portable squeezer.

Rivets & Riveting. (76 pictures-76 frames)
Jam Handy.

Kinds of rivets; tools used; methods of riveting; causes of failure.

Aircraft Controls

(See also *Aircraft Maintenance*, p. 20)

MOTION PICTURES

Attitude Gyro, The. (15 min) 16sd. Sperry.

In all types of planes, the attitude gyro provides pilot with visual indication of his position in any maneuver.

Gyro Compass. (10 min) 1943. 16sd-loan. Sperry.

This is the first gyroscopic instrument to be made by Elmer Sperry. Its importance to the comfort and safety of transportation and to the war effort are depicted. The repeater compass, gyropilot and course recorder are also shown.

Gyrosyn Compass, The. (25 min) Sperry.

A flight and navigation instrument providing a stable turbulence; instrument in action.

Making a Five-Tuck Splice. (26 min) 16sd-\$32.53. USOE-Castle. OE143.

Shows how to solder a cable and to prevent unlaying while splicing; how to use a splicing clamp and a marlin spike; how to make first tuck and four succeeding tucks; how to taper the splice; and how to set, serve, and shellac the splice.

Making a Wrapped and Soldered Splice. (15 min) 16sd-\$22.73. USOE-Castle. OE144.

Shows how to make a ball soldered terminal; how to prevent the wires from unlaying when cut; how to fit a cable to a thimble; how to use a splicing clamp; how to make the wire wrap; how to provide for inspection spacing; how to get the solder thoroughly sweated into the space between wrapping and thimble.

Micro Switches on Aircraft. (30 min) 1944. 16sd-color. Micro-Ray-Bell.

The use of "Micro" precision switches on commercial and military aircraft.

Romance of the Gyroscope. (11 min) 1943. 16sd-loan. Sperry.

The principles of the gyroscope are explained and its development in the past forty years are shown. The scientist Foucault is shown in his discovery of the gyroscope.

Swaging Cable Terminals. (12 min) 16sd-\$17.97. USOE-Castle. OE298.

Shows how to select the dies to fit the cable; how to measure and mark the cable accurately; how to anchor the cable in the terminal; how to set up the swaging machine; how to check work for uniformity and other defects; and how to remove and to clean machine parts.

SLIDE FILMS

Aircraft Nomenclature—Part IV: Cockpits. Navy-Castle. SN60d.

Shows the air speed indicator, compass, altimeter, fuel quantity gage, fuel gage pump, bank and turn indicator and engine gage unit and explains their purpose. Points out the stick, rudder pedals, magneto switch and other controls and explains their operation and use.

TRAINING FILMS



Blind Riveting (see Col. 1, Page 16).

Cable Splicing: Part I. (89 pictures-70 frames). Jam Handy.

The Five-Tuck Navy splice; material used, tools and methods used to replace the spliced control cable connections; precautions.

Cable Splicing: Part II. (39 pictures-46 frames). Jam Handy.

The Roebling Roll splice; material used, tools and methods used; step-by-step procedure for this splicing.

Flight Control Systems. Navy-Castle. SN189.

Using a stick and rudder pedals, demonstrates a simple wire control system and explains torque tube systems, combinations of torque tubes and wires, push-pull tubes, and methods of wheel control in aircraft construction.

Aircraft Control Surfaces

(See also *Aircraft Maintenance*, p. 20)

MOTION PICTURES

Airplane Structures: Control Surfaces. (10 min) 16sd-rental loan. Castle.

Control surfaces: construction, location and function of these surfaces, ailerons, rudders, tail flaps, wing flaps, vertical fins, elevators and horizontal fins. Processes of covering surfaces with fabrics illustrated. Fixed and adjustable trim tabs are included.

Doping Technique. (10 min) 16sd-\$9.11. Navy-Castle. MN66.

Establishes the necessity for dope in airplane fabric covering and demonstrates the technique of brushing, spraying, sanding, hand-rubbing, and waxing.

Rib Stitching. (20 min) 16sd. Jam Handy.

How fabric is placed or stitched on airplane wings; how to use stitching needles; how to tie knots; how to splice stitching cords.

SLIDE FILMS

Aircraft Nomenclature—Part II: Wings. Navy-Castle. SN60b.

Shows the location and function of the spars and the various types of ribs in a wing and names some of the materials from which they may be constructed. Shows three types of flaps and names the airplane control surfaces and explains their operation.

Airplane Flight Control Surfaces & the Wing Flaps. AAF-Castle. FS1-29.

Shows primary and secondary control surfaces; function of control surfaces. Construction, maintenance and inspection are also covered.

Covering With Fabric. (74 pictures-65 frames). Jam Handy.

Covering wing structure; methods; sewing strips together; preparing structure interior; wires, cables; smoothing wrinkles; cutting, fitting; handling protrusions; covering with blanket method; covering with envelope or slip-cover method; tape reinforcing and ribstitching surface; reinforcing patches; doping.

De-Icer Servicing & Installation. (80 frames) si. Jam Handy.

Show principles of operation, installation, and servicing of the Goodrich de-icer.



Building a Box Beam Spar (see Page 19).

Preparation for Fabric Covering. (37 pictures-40 frames). Jam Handy.

Cross rib bracing on wing structures; how to use tape on wood and steel structures; method of securing tape to ribs, taking up an anchoring; dope proofing by means of dope proof paint, cellulose tape and metal foil; fabric estimating, for fuselage, aileron structures, wings, elevators; measuring to warp of material; seam allowances, total lengths, tape required, and how to measure total lengths.

Ribstitching. (47 pictures-47 frames). Jam Handy.

Cutting of anti-tear strips from airplane cloth for wings; applying and doping strips; use of reinforcing tape; applying tape; stitching technique detailed step by step.

Aircraft Sheet Metal Fabrication

(See also Sheet Metal Shop, p. 71)

MOTION PICTURES

Airplane Sheet Metal Work. (22 min) 1942. 16si-\$48; rent—\$3. Cutlorn.

Film deals with three basic projects: drag truss fitting; flange reinforcement, I beam-spar.

Metal Forming in Airplane Production: Bending and Curving. (38 min) 16sd-\$34.47. Navy-Castle. MN938h.

Demonstrates and suggests how existing machine tools, such as draw benches and press brakes, may be adapted to speed up bending and curving of aircraft parts. Both animation and straight photography used.

Metal Forming in Airplane Production: Blanking & Punching. (25 min) 16sd-\$23.18. Navy-Castle. MN938d.

Shows how existing machine tools may be converted and suggests methods by which aircraft production may be stepped up. Routing, routing jigs, high speed saws, the contour saw, and the radius arm drill are explained.

Metal Forming in Airplane Production: Forming Methods. (42 min) 16sd-\$37.35. Navy-Castle. MN938b.

Shows and suggests ways in which both old and new machine forming tools may be adapted to produce aircraft parts. Both straight photography and animation are used.

S L I D E F I L M S

Form Blocks & Forming. Navy-Castle. SN1037.

Shows how metal is shaped by the use of forming blocks and how dies are used for flanging, making hollows and forming joggles.

Forming Outside & Inside Flanges. Navy-Castle. SN295.

Shows the shrinking and stretching of inside and outside flanges on a single piece of metal. A station frame is made from aluminum and the steps are described: make the form block, lay out the metal, bend the flanges.

Hand Forming. Navy-Castle. SN296.

Shows how a streamline cover plate is made by making the form blocks, clamping the material properly in the block, and bumping the material into shape. Drawings and straight photography are used.

Sand Bag Bumping. Navy-Castle. SN293.

Demonstrates a method of making metal parts for planes by using a sand bag as a working base. Shows the necessary equipment and outlines the procedure as: prepare the template, cut the metal, select the right tools, bump the metal properly, and finish the job smoothly. Shows how to make the sand bag.

Aircraft Structures

(See also Aircraft Maintenance, p. 20)

MOTION PICTURES

Airplane Structures: Fuselage Construction. (8 min) 16sd-\$7.38. AAF-Castle. TF1-213.

Describes the fuselage and shows loads exerted upon component parts. Explains the principle of truss construction and attachment of wing; monocoque and semi-monocoque construction of fuselage; use of bulkheads and longitudinal stringers.

Airplane Structures: Wing Construction. (10 min) 16sd-\$8.53. AAF-Castle. TF1-212.

Defines chord, spars and ribs, and their use in construction. Identifies materials used in construction, shows placement of fuel tanks in wings, and factory construction and assembly.

Structures. (45 min) 16sd. N. American Aviation.

Shows the B-25 in flight and discusses the principle of air pressure in relation to construction. Illustrates in detail the structure of the B-25 and the use of cantilever trusses and H beams.

Aircraft Wood Fabrication

MOTION PICTURES

Building a Box Beam Spar. (21 min) 16sd-\$27.71. USOE-Castle. OE297.

Shows how to assemble the parts of the spar in a jig; how to prepare the surfaces for glueing; how to apply aircraft glue; how to clamp parts together for a good glue bond; how to varnish surfaces for protection from moisture; how to use jigs for accurate drilling.

Building a Wooden Rib. (19 min) 16sd-\$27.47. USOE-Castle. OE296.

Shows how to assemble, fit and glue wooden parts in a jig; how to prepare the frame work for plywood gussets; how to fit and position the gussets to the framework; how to apply aircraft glue; how to drive nails, and use clamps for a good glue bond; how to apply varnish.

Laying Out & Forming Plywood. (21 min) 16sd-\$27.71. USOE-Castle. OE285.

Shows how to lay out plywood using blue-prints and templates; how to form plywood in a press; how to reinforce plywood; how to apply and remove pressure strips; how to cut out openings in plywood; and how to apply glue and varnish.

Wing Assembly: The Bow Tip. (24 min) 16sd-\$30.67. USOE-Castle. OE284.

Shows how to fit the bow tip strip; how to mortise the bow tip strip to the leading edge strip; how to make the spar tip joint; how to install the ribs; how to shape the bow tip; how to apply and glue the bow tip skins; how to finish the bow tip; and how to varnish the surface.

Wing Assembly: The Inboard Panel. (19 min) 16sd-\$25.85. USOE-Castle. OE300.

Shows how to install subassemblies in a jig; how to fit and install the junction rib, regular ribs, compression rib, and root rib; how to install and adjust hardware fittings; how to apply and glue the skins; how to reinforce skin openings; how to apply and remove pressure strips; how to finish the outside surface; and how to inspect the completed assembly.

Wing Assembly: The Nose Section. (20 min) 16sd-\$27.09. USOE-Castle. OE299.

Shows how to position the main spar in the jig; how to establish the leading edge line; how to fit the ribs into position; how to install the webbed ribs, junction rib, regular ribs, and leading edge strip; how to apply and remove pressure strips; how to finish the surface of the nose section.

SLIDE FILMS

Mixing & Using Casein Glue. (61 pictures-46 frames) Jam Handy.

Content of casein; keeping casein; mixing methods; checking consistency; preparing the joint; application; clamping the joint; wiping off excess; removing the clamps.

Aircraft Production—

Miscellaneous

MOTION PICTURES

Airplane Structures: Manufacturing Methods. (26 min) 16sd-\$23.76. AAF-Castle. TF1-323.

Describes general manufacturing methods in construction of military aircraft from the first

handling of raw material to completed airplane coming off assembly line.

Airplanes. (35 min) 16sd. USBM.

Metals used in construction; progressive steps in building of cargo plane; importance of lubricants; theory of flight.

Airplanes—Their Metals, Fuels, & Lubricants. (37 min) 1944. 16sd. Sinclair in co-operation with USBM.

Metals used in construction of airplanes, operations of building and assembly. Cutaway engine assembled and described. Correct use of lubricants shown.

Construction of a Light Airplane. (28 min) 1942. 16sd-\$55; rent—\$1 plus transportation. Penn State.

The building of the fuselage, landing gear, tail surfaces, and wings of a Piper "Cub" light plane.

How to Machine Aluminum. (32 min) 1942. 16sd. Aluminum.

Shows fabrication and assembly of aluminum parts and structures.

Look to Lockheed for Leadership. (20 min) 16sd. Lockheed.

History of aviation industry. Plane construction.

Tube Bending by Hand. (15 min) 16sd-\$22.73. OSOE-Castle. OE142.

Shows why tubes must be bent for installation in airplanes; how the jig and mock-up are used; how to measure tubes and check them with specifications; how to set up the tube bending machine for the job; how the various parts of the machine function.

We Give Them Wings. (19 min) 16sd. Douglas.

A picture for the general orientation of new employees or employers who have not been in the shop. It shows the progressive production stages of the Douglas transport type airplane.

SLIDE FILMS

Aircraft Factory, The. (120 frames) sd. Trade-films.

Shows the steps taken by management, engineering, production, and sub-assembly in the construction of airplanes. AWPC member companies contributed material and pictures for this film.

Aviation as a Career—Manufacturing. \$2. SVE.

Fabrication of Tubing. (87 pictures-79 frames). Jam Handy.

Explanation of steps in annealing, bending, fitting and installing copper, aluminum, and dural tubing; making pattern; tools and their use; making connections.

Metalsmiths' Tool Kit, The. Navy-Castle. SN926.

Shows the various tools used by the aviation metalsmith and what they are used for, including directions for keeping tools in good condition.

Occupations in Aircraft Manufacturing. \$2.25. Voca Guidance-SVE.

To the User of the INDEX

Films sponsored by industrial firms are generally available on *free loan*, requiring payment only of transport charges. Where sources indicate commercial producers, film libraries or schools, prints are rented or sold as listings will generally indicate, with rates subject to change.

Wing Auxiliary Fuel Cells. (138 frames) sd. Consolidated Vultee.

Shows the installation of wing auxiliary fuel cells, with the aid of cut away drawings and puppet figures.

AIRCRAFT INSPECTION

MOTION PICTURES

Inspection of Minor Assemblies. (16 min) 16sd-\$23.35. USOE-Castle. OE146.

Shows how to use inspection work sheets; how to plan inspection routine; how to inspect a minor assembly in detail; how to read rivet specifications; and how to inspect rivets.

Inspection of Plumbing & Piping. (17 min) 16sd-\$23.98. USOE-Castle. OE147.

Shows how to use inspection work sheets; how to plan inspection routine; how to inspect plumbing and piping in detail; how to verify the materials used; how to inspect installation of the part in the plane; and how to identify different plumbing lines.

Inspection of Sheet Metal Parts. (20 min) 16sd-\$27.09. USOE-Castle. OE145.

Shows how to use inspection work sheets; how to plan inspection routine; how to inspect a sheet metal part in detail; how to make visual inspection; and how to make spot checks.

No Substitute for Safety. (30 min) 16sd. Douglas.

Presents the importance of inspection, showing typical processes in inspection of small parts, strength of material, tools, etc.

Periodic Inspection—Airplane. (17 min) 16sd-\$23.98. USOE-Castle. OE282.

Emphasizes the importance and meaning of thoroughness in performing a periodic inspection, showing a complete detailed inspection of an aileron as an example. Shows briefly the inspection of other parts of the airplane and emphasizes that all parts must be as thoroughly inspected as the aileron.

Periodic Inspection—Engine. (23 min) 16sd-\$30.05. USOE-Castle. OE283.

Shows how to inspect the general condition of an engine; how to examine internal parts; how to check ignition and fuel system; how to examine the propeller; how to inspect for tightness, security, and proper safetying of all parts; how to prepare an engine for run-up.

Preflight Inspection—Airplane. (17 min) 16sd-\$23.98. USOE-Castle. OE280.

Shows the necessity for careful and thorough inspection; how to use the "circle" method to give a complete and systematic inspection; and how each part—landing gear, wings, fuselage, tail surfaces, cabin, controls, instruments—is inspected.

Preflight Inspection—Engine. (13 min) 16sd-\$19.21. USOE-Castle. OE281.

Shows the importance of continuous preventive maintenance in keeping an aircraft engine air-worthy; the need for safe working habits during inspection; how to inspect the engine systematically—propeller blades and hub, cowlings, controls, ignition system, and fuel system; how to conduct an engine run-up; and the inspector's responsibility in signing the preflight inspection form.

S L I D E F I L M S

Check & Double Check. si. Jam Handy.

Check points, cotter keys, safety wires; checking the airplane for safe operation.

Inspection Before Fabric Covering. (68 pictures-71 frames) Jam Handy.

Need for inspection; inspection of drag tubes, controls, electrical system, minor structures and fabric surfaces, and how to check each in wings, tail assembly, ailerons, fuselage; the recheck.

AIRCRAFT MAINTENANCE

(see also Aircraft Inspection)

Aircraft Alighting Gear

(see also Aircraft Production)

MOTION PICTURES

Inspecting & Adjusting Hydraulic Brakes. (13 min) 16sd-\$19.21. USOE-Castle. OE255.

Shows how to inspect the hydraulic brake system; how to bleed hydraulic brakes; how to add fluid to the hydraulic system reservoir; how hydraulic brakes operate; and the importance of entering the job in the log book.

Installing Landing Gear. (19 min) 16sd-\$26.47. USOE-Castle. OE257.

Shows how to remove damaged landing gear; replace old bolts, nuts, and cotters with new parts; install an aircraft bolt properly; assemble and install a new landing gear; and check alignment and track of wheels.

Keep 'Em Landing. Cleveland Pneumatic.

Shows dis-assembly, assembly, maintenance of main leg and nose aerols (landing gear) on the Bell P-38 fighter plane.

Repairing Aircraft Tires. (20 min) 16sd-\$27.09. USOE-Castle. OE254.

Shows how to inspect an airplane tire; how to remove the tire; how to remove the tube from the tire; how to vulcanize the tube; how to repair a cut in the tire; how to reinstall the wheel; and the importance of entering the job in the log book.



Repairing Aircraft Tires (see above).

Repairing & Relining Mechanical Brakes
(21 min) 16sd-\$27.71. USOE-Castle. OE256.

Shows how to check brake action; how to remove wheel and inspect brakes; how to disassemble wheel and remove brake lining; how to install new brake lining; how to replace brake cables; how to adjust brakes.

S L I D E F I L M S

Aircraft Tires—Part I: Maintenance & Repair. Navy-Castle. SN491a.

Shows the different types of tires, tubes and rims that make up a tire assembly; tools used in working with tires; precautions to be taken in working with tires to prevent failure and lengthen tire life; how to make minor repairs on tubes; and the importance of periodic inspection and proper inflation.

Aircraft Tires—Part II: Maintenance & Repair. Navy-Castle. SN491b.

Continues discussion of Part I.

Brakes & Landing Gear Mechanism: Part I.
(34 frames) si. Jam Handy.

Inspection of fixed landing gears, supporting struts, shock-absorber struts, brake assembly, tires, and tail wheel.

Brake & Landing Gear Mechanism: Part II.
(63 frames) si. Jam Handy.

Inspecting and driving the retractable landing gear mechanism.

Landing Gear—B-24D. (120 frames) Consolidated Vultee.

Shows the assembly, removal, and retraction of the main and nose landing gear of the B-24D.

Products of Progress. sd slide film. Florez.

Covers the construction, principles of operation and service methods recommended by Bendix regarding their B-K power brakes.

Aircraft Controls

& Control Surfaces

(see also Aircraft Production)

M O T I O N P I C T U R E S

Attaching & Aligning Wings. (20 min) 16sd-\$27.09. USOE-Castle. OE258.

Shows how to inspect a damaged wing; remove the damaged wing and attach a new wing; level the airplane and align the wing; complete the installation of the wing; and inspect the finished job.

Connecting & Adjusting Controls. (19 min) 16sd-\$25.85. USOE-Castle. OE260.

Shows how to inspect and adjust the elevator and rudder control cables; how to line up and safety a turnbuckle; how to remove and replace a damaged aileron control cable and to adjust it for the proper aileron travel; and how to make a final check-up of control cables before entering the job in the log.

Installing & Aligning Tail Surfaces. (19 min) 16sd \$25.85. USOE-Castle. OE259.

Shows how to inspect damaged tail surfaces and remove them; how to prepare new parts for installation; how to install new stabilizers, elevators, and rudder; and how to inspect the job before entering it in logbook.

S L I D E F I L M S

Care & Repair of Flight Controls. Navy-Castle. SN127.

A systematic procedure for examining and cleaning cables, pulleys, fair-leads or guides, and hinges, which connect the controls of a plane with the cockpit, is demonstrated. Questions point out what to look for and check.

Fabric Repair. (58 pictures-46 frames). Jam Handy.

How to repair punctures and tears in airplane fabric by patching; types of patches used; how to make patches; trimming hole; preparing surrounding surface; cutting fabric patch; pinking and fraying patch; applying patch; sewing tears; repairing large area; sewing patch; repairing stretched but unbroken fabric.

Flight Instruments. (126 frames) si. Jam Handy.

Principles of operation; corrections and use.

Hand Tools for Fabric Work. Navy-Castle. SN102.

Deals with the tools needed by the airplane mechanic to make fabric repairs. Demonstrates how to sharpen a pocket knife, shows the straight shears, "pinking shears," the short straight needle, and the curved needle. Explains their use and care.

Introduction to Airplane Instruments. AAF-Castle. FSI-23.

Principles of instrument operation, with discussion of electrical and mechanical types.

Rigging Changes After Flight Check. Navy-Castle. SN136.

Shows how to make changes to correct faults revealed in the test flight. The faults covered are nose heaviness, tail heaviness, wing heaviness, yawing, and ground-looping.

Aircraft Structure

(see also Aircraft Production)

M O T I O N P I C T U R E S

Making Sheet Metal Repairs. (19 min) 16sd-\$26.47. USOE-Castle. OE252.

Shows how to remove damaged area around a hole in an airplane fuselage and lay out trim lines; how to prepare hole to receive patch; how to "bump" out plug and doubler; how to mark and drill plug and doubler; how to rivet completed patch to part.

Patching Fabric. (22 min) 16sd-\$28.33. USOE-Castle. OE250.

Shows how to cut out the damaged area; how to prepare the damaged area; how to prepare a patch; how to ribstitch a patch; how to finish a patch.

Patching Plywood. (26 min) 16sd-\$32.53. USOE-Castle. OE249.

Shows how to prepare the damaged area; how to splay the edge of the hole; how to prepare and apply a splayed patch; how to make a flush or plug-type patch; how to make a frame or doubler; and how to apply a flush patch.

Repairing a Wooden Rib. (24 min) 16sd-\$31.29. USOE-Castle. OE247.

Shows how to remove gussets, broken rib parts; how to splice a section of cap strip; how to cut, finish scarf joint; how to make a new truss member; and how to make, assemble gussets and reinforce cement plates.



Repairing Structural Tubing (see below).

Repairing Structural Tubing. (20 min) 16sd-\$27.09. USOE-Castle. OE253.

Shows how to straighten a bent tube; how to round out a tube; how to remove a damaged section of tube; how to check and align a sprung fuselage; how to prepare a replacement of tube; how to prepare internal reinforcing sleeves; and how to assemble and weld the replacement section and sleeves.

Splicing a Wooden Spar. (21 min) 16sd-\$27.71. USOE-Castle. OE248.

Shows how to determine the splice area and layout the splice; how to cut a scarf joint on a spar; how to finish a scarf face by hand; how to glue and assemble a scarf joint; how to make, glue, and assemble reinforcement plates; how to trim a spar to shape and size.

S L I D E F I L M S

Cleaning & Painting Tie Rods & Struts. Navy-Castle. SN23.

Describes the removal, inspection, cleaning, priming, painting, replacement and proper care of tie-rods. Details are also included on inspection, cleaning, priming, painting, and waxing of struts.

Repairing Channels & Stringers. Navy-Castle. SN297.

Explains the function of channels and stringers; discusses their repair and demonstrates how to lay out and form a splice for a channel type stringer with a bending brake, steel form blocks, and wood form blocks.

Repairing Sheet Metal Surfaces. (54 pictures-60 frames). Jam Handy.

Classification of repairs most often needed and how to make these sheet metal repairs; changing specifications; removing dents; repairing cracks; repairing holes; replacing panels; safety precautions.

Aircraft Maintenance—

Miscellaneous

M O T I O N P I C T U R E S

Adjustments After Check Flight. (19 min) 16sd-\$25.85. USOE-Castle. OE261.

Shows some causes of nose-heaviness, tail-heaviness, yawing, torque tendency, rough propeller and ground looping; how to determine particular cause of these troubles; how to make the necessary adjustments.

Airplane Mechanic, The. (9 min) 16sd-\$15.49. USOE-Castle. OE278.

Planned as an orientation film for beginning airplane mechanics; shows and explains the skills and knowledge required to make satisfactory inspections and repairs; emphasizes the importance of thoroughness, skill, and dependability.

Margin for Victory. (25 min) 16sd. Douglas.

Designed to help in the problem of damaged threads on aircraft parts and the gauges that test them.

Servicing an Airplane. (17 min) 16sd-\$23.98. USOE-Castle. OE279.

Shows how to perform the various routine servicing operations on a light airplane, including proper and safe methods of pushing a plane on the ground, cleaning an airplane, refueling, changing oil, inflating tires, and starting engine. Shows hand signals for guiding the pilot. Emphasis throughout the film is upon the importance of the job and doing it safely.

S L I D E F I L M S

Cleaning the Airplane. Navy-Castle. SN121.

Demonstrates cleaning the landing gear, fabric and metal surfaces, general cleaning of the fuselage and cockpits and the floats. An explanation of the various types of cleaners and cleaning equipment is included. Safety precautions are emphasized.

Cockpits & Cabins—B-24D. (86 frames) Consolidated Vultec.

Ventilation system, furnishings, window removal and installation, nose wheel door removal and installation, armament.

Handling the Airplane. Navy-Castle. SN252.

Emphasizes the dangers of careless handling of an airplane on the ground and recommends procedures to be followed, using a primary trainer for purposes of illustration. Instructions for climbing into, towing, and pushing the plane on the ground are given.

Refueling the Airplane. (57 pictures-64 frames). Jam Handy.

Responsibility for refueling; preparations before refueling; safety measures; equipment required; step-by-step procedure; grounding hose nozzle and plane; avoiding static electricity; keeping gasoline clean; handling fuel hose.

Servicing Hydraulic Systems. Navy-Castle. SN115.

Straight photography, charts, and cartoons are used to show the parts of the airplane operated by the hydraulic system. Emphasis is placed on servicing procedures.

Thermometer. AAF-Castle. FS1-51.

Describes the use, operation and maintenance of various types of aircraft thermometers.

AVIATION—

MISCELLANEOUS

M O T I O N P I C T U R E S

Bring 'Em Down Alive. (30 min) 1941. 16si. Pioneer.

How parachutes are made and packed and how they are tested, both from a test tower and from an airplane.

Electrically Heated Flying Suit, The. (20 min) GE.

A teaching film for Army and Navy pilots and plane crew members.

Parachutes for Safety. (52 min) 1912. 16sd-rent-\$4. Bray.

The various uses of parachutes, how they are made, and tested for use; correct method of packing a chute; how to properly service and operate a parachute.

S L I D E F I L M S

Aviation Series. (50 frames each) si. SVE.

Slide films on the following aircraft subjects, designed to furnish a general background:

Historical	Aerial photography
Construction	Aircraft in other industries
Engine	Famous flights and fliers
Instruments	Army aircraft
Propellers	Navy aircraft
Lighter-than-air	Radio and aircraft
Land planes	Accessories
Seaplanes	Special equipment
Parachutes	Aircraft schools
Maintenance	Gliders and light planes
Autogyros	

Aviation Subjects. (18 slide films) sale. Trade-films.

Specific visual aids for aircraft production training intended for pre-employment, induction,

and upgrading training: 1. The Engineer's Relation to Production; 2. The Engineer's Relation to Assembly; 3. Riveting; 4. Blueprint Reading; 5. Gas Welding; 6. Arc Welding; 7. Resistance Welding; 8. Jigs and Fixtures; 9. Methods of fabrication; 10. Methods of Assembly; 11. Forming Machines; 12. Cutting Machines; 13. Lathes; 14. Mills; 15. Heat Treatment of Aluminum Alloys; 16. Processings; 17. Safety; 18. The Component Parts of an Airplane.

Parachutes. (72 frames) Jam Handy.

One of the Pilot Training Kit films, dealing with the construction, care, and use of parachutes.

Parachutes: Construction & Care of Parachute. AAF-Castle. FS1-16.

Illustrates the various types of parachute assemblies, the three major units, and their construction. Also shows proper and improper methods of handling the parachute.

Parachutes: Folding & Packing. AAF-Castle. FS1-49.

Adjusting harness to the wearer. Inspection of parachutes to determine which are repairable and which should be condemned. Drop testing; cleaning and drying; system of storage and shipping.

Parachutes: Inspection. AAF-Castle. FS1-56.

Illustrates the system of inspecting the service seat type parachute, both routine and complete inspections.

Automotive Industry

BUS OPERATION

M O T I O N P I C T U R E S

Operator & His Job, The. (12 min) 16sd-\$19.00. USOE-Castle. OE491.

This visual aids unit illustrates by typical situations the three prime responsibilities of the bus operator—the safety and comfort of his passengers and people on the streets; maintenance of schedules; and a courteous, friendly, and helpful attitude towards passengers.

Operator & His Passengers, The. (18 min) 16sd-\$25.81. USOE-Castle. OE492.

This visual aids unit emphasizes the importance of good customer relations, and, through various typical situations, points out ways of handling problems that may arise—such as expired transfers, people who miss their stops, talkative persons, and passengers who crowd at the front of the bus.

Operator Safety, The. (19 min) 16sd-\$26.46. USOE-Castle. OE493.

This visual aids unit points out the importance of safety in bus operations. It shows what safety checks should be made; what safe following distance is; and how to operate safely in passing, at intersections, at bus stop zones, and under special weather conditions.

School Bus Operation—Part I: Care & Maintenance. (13 min) 16sd-\$19.65. USOE-Castle. OE491.

This visual aids unit points out the importance of daily and weekly maintenance checks and

the points to be checked; how to start, steer, and stop the bus; and how to double clutch; safe driving habits.

School Bus Operation—Part II: Passengers, Driving Hazards, Safety. (14 min) 16sd-\$21.95. USOE-Castle. OE495.

This visual aids unit emphasizes the driver's responsibility for the safety of child passengers and shows, through several typical situations, safe driving habits and safety in handling children when they are getting on and off the bus.

ENGINEERING

Brakes

M O T I O N P I C T U R E S

Keep 'Em Holding. (20 min) 16sd-free loan. Thermoid.

Basic principles of the hydraulic brake, all adjustments on most types of hydraulic brakes in use today; proper relining methods.

Stop That Car. (10 min) 16sd. Jam Handy.

Demonstrates the existence of energy in light, heat and motion, the interchangeableness of these forms of energy, their application in motor car brakes.

S L I D E F I L M S

Bendix Brakes. (sd slide) Florez.

Explains the theory of hydraulic brakes and details the service procedure in the installation of new shoes.

Brake Drums & Shoes. (85 frames) 1940. si. Jam Handy.

The fundamentals of shoe and drum braking systems. Self-energizing principles. Lining and heat dispersion.

Brake Operating Linkage. (54 frames) 1940. si. Jam Handy.

The construction and operation of the mechanically operated brake from foot or hand control to the shoes.

Hydraulic Brakes. (66 pictures-62 frames) Jam Handy.

Explaining of the hydraulic principle and its use in actuating the brake shoes.

Inertia. (93 frames) 1939. Jam Handy.

Sound slidefilm with 16-inch double faced record. Inertia is explained in simple terms and by analogies. Then the effect of inertia on the operation of an automobile is discussed. A number of safety suggestions are illustrated and discussed.

Power Brakes. (92 pictures-86 frames) Jam Handy.

Compressed air and vacuum type brakes.

Vacuum Power Brakes. (45 pictures-43 frames) Jam Handy.

Maintenance and adjustment.

Body

MOTION PICTURES

Making of Safety Glass. (30 min) 16si-trans-
portation loan. Ford in cooperation with
USBM.

Shows in detail the making of safety plate
for automobiles.

SLIDE FILMS

Major Body Repairs. (67 pictures-86 frames)
Jam Handy.

Measuring the damaged body to sure it up,
roughing out the inner frame work, further rough-
ing out, finish bumping operations.

Turret Tops—Part I: Repair. (59 pictures-
63 frames) Jam Handy.

Complete instructions in the procedure for
repairing damaged turret tops.

Turret Tops—Part II: Replacement. (138
pictures-136 frames) Jam Handy.

Complete instruction in the procedure for re-
placing turret tops damaged beyond repair.

Electrical System

MOTION PICTURES

Ignition & Spark Plugs. (10 min) 16sd-free
loan. Champion.

Complete ignition system of one-cylinder engine
depicted.

Sound vs. Silent Slidefilms

Where listings indicate "sound" (sd) under
slidefilms, subjects are accompanied by re-
corded lecture on a 33-1/3 rpm transcription
disc requiring suitable turntable reproducer.
Where sound is not specifically indicated,
subjects are *silent* filmstrips requiring only
35mm filmstrip projector.

Ignition & Spark Plugs. (25 min) 1944. 16sd-
\$50; rent-\$1.50. Bray.

Entire ignition system of the automobile with
all its parts shown in straight photography and
animation.

Made to Take It. (25 min) 16sd-loan. A.C.
Spark Plug Division, G.M.

Shows step by step procedure in manufacture
of spark plugs.

Story of a Spark Plug. (30 min) 16si. (34
min) 16sd. Champion in cooperation with
USBM. (loan, transportation only).

Shows the principles of operations of internal
combustion and the use of spark plugs in trac-
tors, motor boat engines, and automobiles. Ani-
mated drawings show action and function of
spark plug. Shows manufacturing processes in
making plugs.

Story of a Storage Battery. (30 min) 1929.
16si-free loan. Willard in cooperation with
USBM.

History of storage battery. Covers production
of storage batteries, inspection, testing, and
proper care. Animated drawings visualize action
in battery during charging, and recharging.

SLIDE FILMS

Auto Mechanics. (60 frames) 1941. si. SVE.

Wiring and electrical system in automobiles.
Covers fuel combustion, carburetors, the motor,
and the ignition system. Diagrams the entire
electrical system.

Chassis Electrical Systems. (42 frames) 1940.
si. Jam Handy.

Typical passenger-car wiring diagram. Opera-
tion and purpose of the fuse. Suggestions on
handling car wiring.

Copper Nerves. 35mm-sd. Florez.

This film shows the principles of automotive
electrical systems and gives service hints.

Current & Voltage Regulation. (110 pictures-
103 frames) Jam Handy.

Necessity for generator regulation. Explana-
tion of third-brush and external current and
voltage regulation.

Generator Regulator, The. (69 pictures-77
frames) Jam Handy.

Complete checks and adjustments on the 1940
and 1941 generator regulator.

Good Ignition. 35sd. Florez.

This film deals with the complete ignition sys-
tem of motor vehicles; contains many useful
service tips.

Ignition System. (85 pictures-70 frames) Jam
Handy.

Showing construction and operation of coil,
condenser, breaker points, distributor, and spark
plugs.

Ignition Trouble. (126 pictures-116 frames)
Jam Handy.

"Rule of thumb" checks for road trouble. Pre-
ventive maintenance checks with ignition testing
instruments.

Watts Regulation & Heavy Duty Regulators.
sd. Florez.

Covers the subject of operation, inspection and
servicing the passenger-car voltage regulators.

Wiring System, The. (55 frames) si. Jam Handy.

Progressive checks to determine location of trouble in the wiring system—except ignition.

Engines

(see also *Engines*, page 41)

MOTION PICTURES

Anti-Freeze—A Story of Scientific Research. (1 reel) 16sd. Nat'l Carbon.

The performance of various types of anti-freeze in motor and cooling systems at controlled temperature of 40 degrees below zero.

Automobile Cooling System. (20 min) 16sd. Nat'l Carbon.

Shows charts of cooling systems; various radiator cleaners; methods of cleaning and pressure flushing.

Endless Channels. (5 reels) 16sd-transportation only. Perfect Circle.

Shows piston rings at work inside the engine. Development is traced.

Horsepower. (9 min) 16sd-\$36. Jam Handy.

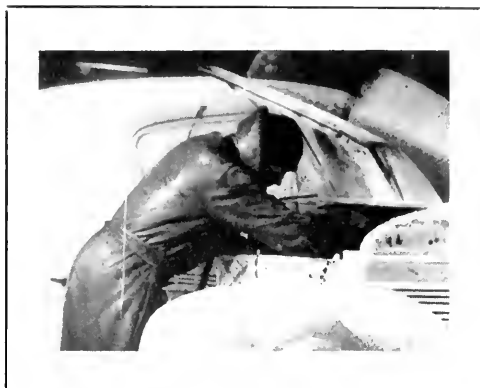
The application of horsepower to automobiles, its origin and meaning. How horsepower of automobile has been increased cylinder by cylinder.

Making A V-Type Engine. (30 min) 1936. 16si-loan. Ford in cooperation with USBM.

From the ore, through the blast furnaces, adding alloys, casting the molten iron, through the heat treatment to the machining operations on sundry parts of the engine, to the checking of these parts for accuracy, to the assembly of all parts of the engine, tested and placed in the chassis.

Power. (10 min) 16sd. Jam Handy.

Four stroke cycle engine, its use in the automobile.



Anti-Freeze—A Research Film (See Col. 1).

Engine Control Systems. (45 pictures-38 frames) Jam Handy.

Three types of controls: the flexible wire and cable type, rigid tubing and wire type, and the push pull tube type; the use of these types of cables. Methods of adjusting, inspecting and lubricating the controls. Various types of control handles.

Engine Instruments. (44 pictures-53 frames) Jam Handy.

Principles of operation—what to look for.

Engine Lubricating Systems. (73 pictures-63 frames) Jam Handy.

Explaining splash, pressure, combinations and refinements.

Engine Tune-Up (Part I). (70 pictures-64 frames) Jam Handy.

The importance of engine tune-up. A general outline of procedure which can be followed in a tune-up.

Engine Tune-Up (Part II). (106 pictures-80 frames) Jam Handy.

Continuing the procedure started in Part I.

Low Down on the Tuneup, The. sd. Florez.

Shows recommended tune-up procedure for a 6-cylinder automobile.

Modern Valve Reconditioning. (55 pictures-57 frames) Jam Handy.

Instructions for valve grinding, valve seat facing, valve guide service, and reassembly instructions.

Pushrod Assembly. (51 pictures-46 frames) Jam Handy.

Functions, characteristics of various engine pushrods, and their importance. Removing pushrods. Inspection of pushrods. Maintenance of pushrods. Assembly of pushrods.

Starting Motor, The. (89 pictures-87 frames) Jam Handy.

General principles, construction, and operation. Explanation of the Bendix drive, mechanical shift, and solenoid applications.

Purchase Sources of Training Films

Frequent listings in these pages of Bray, Castle, Encyclopaedia Britannica Films, Florez, Jam Handy, SVE, Vocafilm, etc. among sources, indicate *purchaseable* training film material. Write to producer for preview information, latest prices and other reference data.

SLIDE FILMS

Adjusting Valves. (30 pictures-35 frames). Jam Handy.

Preparing the engine for valve adjustments; adjusting the valve on number one cylinder; checking of other valve mechanisms; adjusting the remaining valves.

Allen Method of Modern Motor Tune-up. Allen.

Illustrates the principles of operation and trouble shooting in relation to the modern automobile engine.

Checking Valve Clearance. (47 pictures-54 frames.) Jam Handy.

How to prepare engine for check by removing rocker box covers and a spark plug from each cylinder and placing the piston on top center on the firing stroke—check on parts of the valve operating mechanisms.

Down Draft Carburetor, The (Part I). (58 pictures-63 frames) Jam Handy.

Complete assembling instructions for down-draft carburetors from 1934 to 1941 inclusive.

Downdraft Carburetor, The (Part II). (40 pictures-49 frames) Jam Handy.

Practical repair methods used in correcting troubles. Models 1934 to 1941 inclusive.

That High Power Top Inch. sd. Florez.

Shows service procedure for replacement of piston rings.

Up-Draft Carburetor, The. (51 pictures-41 frames) Jam Handy.

The disassembly, reassembly, and adjustment of the up-draft carburetor for cab-over-engine trucks.

What Is Good Tune-Up. sd. Florez.

Gives some basic "why" principles on the importance of certain steps in the tune-up procedure for an internal combustion engine.

Transmission

MOTION PICTURES

Around the Corner. (11 min) 16sd-\$36. Jam Handy.

The automobile differential in operation, its principles and the steps leading to its development.

Soft Pedal. (10 min) 16sd. Jam Handy.

Operation and action of drive shaft, universal joint and differential, and clutch pedal are shown.

Spinning Levers. (10 min) 16sd. Jam Handy.

The principles of the spinning lever and its relation to the automobile are illustrated.

SLIDE FILMS

Clutch, The. (54 pictures-55 frames.) Jam Handy.

Cone and friction disc types and their principles of operation.

Completing the Transmission of Power. (39 pictures-38 frames.) Jam Handy.

Propeller shafts, universal joints, and Hotchkiss and torque tube drives.

Differential, The. (41 pictures, 39 frames) Jam Handy.

Why it is used and how it operates.

Four-Speed Transmission. (61 frames) Jam Handy.

Disassembly, inspecting and reassembly.

Inside Story of the Automobile Clutch. sd. Florez.

Covers the service procedure involved in the replacement of an automobile clutch.

Power Transmission Trouble. (81 pictures-68 frames) Jam Handy.

Most common sources of trouble in the clutch, transmission, universal joints, propeller shaft, and rear axle assembly.

Transmission, The. (66 pictures-60 frames) Jam Handy.

Application of power through gear reduction, explaining the simple selective gear transmission.

Two-Speed Rear Axle, The. (80 pictures-85 frames) Jam Handy.

Disassembly, inspection, reassembly, and adjustment.

Synchro-Mesh Transmission, The. (151 pictures-127 frames) Jam Handy.

Disassembly, inspection repair, and reassembly of the Synchro-Mesh transmission for 1937, 1938, and 1939 plus information on 1910 and 1911 models.

Vacuum Gear Shift. (72 pictures-130 frames) Jam Handy.

Repair, adjustment and maintenance of the entire vacuum gear shift unit.

Wheels & Mounting

MOTION PICTURES

Curve Control. (10 min) 16sd. Jam Handy.

Types of steering mechanisms illustrated with steering principles given.

Springs. (13 min) 16sd. BIS.

It demonstrates the principle on which all springs operate and shows their actual manufacture. Animated diagrams show the difference in action between the short and long spring on a car and the advantage of each. The shock absorber, the friction type and the hydraulic type.

SLIDE FILMS

Front Axles & Steering Gear. (79 pictures-70 frames) Jam Handy.

Explanation of Elliott, reverse Elliott, and Lemoine axle ends. The basic steering-gear linkage and types of worm-gear applications.

Full-Floating Rear Axle (Part 1). (38 pictures-39 frames) Jam Handy.

Axle shaft replacement and rear wheel bearing replacement.

Full Floating Rear Axle (Part 2). (57 pictures-56 frames) Jam Handy.

Third member assembly overhaul, including propeller shaft, universal joint, ring gear, pinion, and differential assembly.

Hypoid Rear Axle. (105 pictures-124 frames) Jam Handy.

Complete overhauling instructions for both passenger car and truck hypoid rear axles.

Knee Action (Part 1). (Prior to 1939) (27 pictures-31 frames) Jam Handy.

Removal and replacement of the Dubonnet type knee-action unit used prior to 1939.

Knee Action (Part 2). (Prior to 1939) (60 pictures-61 frames) Jam Handy.

Disassembly and reassembly of the unit itself after removal from car.

Knee Action (Part 3). (1939, 1940, 1941) (53 pictures-59 frames) Jam Handy.

Disassembly, inspection, repair, and reassembly of the 1939-41 knee-action unit, not the Dubonnet type.



Introduction to Preventive Maintenance

Rear Axles. (57 pictures-47 frames) Jam Handy.

Explaining the principles involved in semi-floating, three-quarter floating, and full-floating rear axles.

Shock Absorbers. (52 pictures-50 frames) Jam Handy.

Types and uses.

Springs. (103 pictures-91 frames) Jam Handy.

Principles of spring suspension—types—"knee-action."

Steering Gear, The. (103 pictures-116 frames) Jam Handy.

Removal, disassembly, inspection, reassembly, and adjustment of the worm and straddle mounted sector type of steering gear used on 1937 trucks and conventionally sprung passenger cars and 1938 and 1939 trucks, plus information on 1940 and 1941 trucks.

Wheel Alignment. sd-sale or loan. Ford.

Deals with the technical service aspects for the correction of caster, camber, and toe-in for a Ford automobile.

Wheel Alignment & Balance. (118 frames) Jam Handy.

Principles behind and governing wheel alignment and front end angles. Principles of static and dynamic wheel balance.

Wheel Balancing. (58 frames) Jam Handy.

Complete instructions for both static and dynamic wheel balancing.

Wheels, Rims, & Tires. (78 frames) Jam Handy.

Automotive mechanical training.

General

MOTION PICTURES

Automobile. (15 min) 1942. 16si-\$24. or write for nearest distributor. EBFilms.

The assembling of parts of automobile; operations of the engine, transmission and differential.

Down the Gasoline Trail. (10 min) 16sd. Jam Handy.

An animated drop of gasoline is followed step by step through the fuel system. The inner workings of the fuel system shown.

Ceramic & Glass Industries

(See also Optics & Photography, p. 65)

MOTION PICTURES

ABC of Pottery Making, The—The Coil Method. (15 min) 1938. 16si. U. of So. Cal.

Forming of the base, application of the coils, blending one coil into another; shaping on the potter's wheel. The other tools used are covered in this film.

Blow Pipes. (36 min) 1940. 16sd-color. Owens-Ill Glass.

Film shows how glassware is manufactured by hand and by machine. Shows every step in making of modern American glassware.

TRAINING FILMS

Elements of the Automobile, The. (12 reel) 16 & 35si-sale or rental. Bray.

A 12 reel series photographed from working models, explaining the operation of standard type of automobile mechanism. Deals with building operation and functioning of every part of car. Reels 1 & 2, Running Gear and Differential; Reels 3 & 4, The Engine; Reel 5, The Carburetor; Reels 6, 7 & 8, Fuel and Ignition; Reel 9, Cooling System and Clutch; Reels 10 & 11, Transmission; Reel 12, Brakes.

Introduction to Preventive Maintenance. (13 min) USOE-Castle. OE161.

Reasons for preventive maintenance; objectives of the preventive maintenance program; importance of preventive maintenance in truck operation; typical checking and testing procedures; maintenance of effective record systems.

It's Up to You. (20 min) Caterpillar.

Tractor maintenance and correct servicing procedure with trouble-shooting sequences presented in animated drawings.

Lubrication of Automobile. (15 min) 16si-transportation only. Standard Oil in cooperation with USBM.

Shows research conducted by engineers to develop and test suitable lubricants for modern high-speed, close-fitting engines and depicts large number of lubricants necessary to scientifically lubricate cars, trucks and busses under all climatic and operating conditions.

Rhapsody in Steel. (20 min) Ford.

Assembly of the parts of a Ford car in stop-motion photography synchronized with an original musical score.

S L I D E F I L M S

Automobile Industry, Careers In. \$2. SVE.

Automobile Manufacture, River Rouge Plant. \$2. SVE.

Cab-Over-Engine Truck. (63 pictures-69 frames.) Jam Handy.

Instructions covering the changes in service procedure due to the unconventional design of cab-over-engine trucks.

Safety Factors. (105 pictures-77 frames) Jam Handy.

Maintenance of brakes, steering gear, horn, lights, and windshield wiper.

Brick—From Clay to Pavement. (10 min)

1937. 16sd-transportation only. USDA.

The final product, vitrified paving brick, is shown first as clay and is carried through all the processes of manufacture.

From Desert Sands to Sparkling Glass Creations. (25 min) 16si. Kerr.

Entire process of making glass is shown.

Glass Blowing Technique. (15 min) 1924. 16si-\$24 or write for nearest distributor. EBFilms.

Part I: Elementary glass blowing, procedure and manipulation. Part II: Shows methods of forming bulbs, and techniques in joining tubes of unequal diameter.



A Sperry Training Class at Work
PHOTO BY VICTOR

Glass Servant of Man. (56 min) 16si. Owens-III Glass.

Machine and hand making processes in all types of glass products are shown.

Glassing in Duraglas Containers. (28 min) 1944. 16sd-color. Owens-III.

Colorful scenes filmed in customers' food packing plants prove conclusively that Duraglas containers can "take it." It is the story of modern container engineering and design combined with efficient food and package handling techniques.

Heat-Treated Safedge Glassware. (13 min) 1945. 16sd-color. Owens-III Glass.

Shows the manufacture of Libbey heat-treated tumblers both by hand and by machine; graphic delineation of processes responsible for the resistance of Safedge glassware.

Looking Through Glass. (18 min) 1943. 16sd. BIS.

The manufacture of plate glass and glass objects in British factories showing the hand craftsman at work alongside the mass-production machines.

Making Glass. (14 min) 1939. 16si-\$24; rent-\$1.50. Sazin.

Four different objects are shown in process of making. Filmed at the World's Fair glass center.

Making of Fine China. (1 reel) 16-color-rental. Lennox; Castle.

Process is shown of the manufacture of fine pieces of pottery in the Lennox plant.

Manufacture of Laminated Glass. (8 min) 16sd-loan. Pittsburgh.

Step-by-step manufacture of laminated glass is shown.

Manufacture of P C Glass Bricks. (8 min) 16sd-loan. Pittsburgh.

Manufacturing steps are shown.

Manufacture of Pennvernon Window Glass. (8 min) 16sd-loan. Pittsburgh.

Various manufacturing steps are shown.

Manufacture of Plate Glass & Mirrors. (15 min) 16sd-loan. Pittsburgh.

From the raw materials to the finished product, the various steps in manufacture are shown in a trip through the factory.

Manufacturing Brick. (2 reels) 16-transportation only. Mechanical.

Contrasts new methods of manufacturing brick with the old.

Quality Control. (39 min) 1942. 16sd-color. Owens-III.

This is the story of quality control at every point in the manufacture of glass, from the time the raw materials are mined until the finished product is off the line. Also quality control on cartons used for shipping glass containers is depicted.

Romance of Glass. (20 min) 1937. 16si-sd. Ball Bros.

The entire process involved, the machinery used, in the making of glass jars.

Safety Glass. (30 min) 16 & 35si. USBM.

From the preparation of raw materials to the finished product, the story of safety glass is shown.

Sand & Flame. (20 min) 16sd. GM.

The making of glass from sand and flame: 1. automatic bottle making; 2. manufacture of fine glass tubing; 3. transformation of glass marbles into fibres; how these fibres are spun into glass threads for the weaving of cloth and tape for electrical insulation; 4. the manufacture of glass brick; 5. plate glass manufacture including the furnacing, rolling, cutting, grinding, and polishing; 6. how plate glass panes are made into shatter-proof glass.

That the World May See. (19 min) 1944. 16sd-color. Owens-III.

This film traces the development of the glass business from its early beginnings in this country. It is the story of Mike Owens who started his apprenticeship as a young boy, and who, a few years later, came to Libbey Glass Company as a glass blower with dreams which eventually revolutionized the industry. The broad scope of the present Owens-Illinois organization is depicted, together with the various types of products made at each plant.

S L I D E F I L M S

Brick & Stone Masonry. \$2. SVE.

Ceramic Engineering as a Career. \$2. SVE.

Chemical Industry

MOTION PICTURES

Analytical Balance Technique. (30 min) 1941. 16si-\$8; rent-\$3. Brandon.

Theory and practice of measure.

Atacama Desert. (19 min) 16sd. OIAA.

The working of rich nitrate deposits in the deserts of northern Chile by modern mining methods.

Catalysis. (10 min) 1937. 16sd. EBFilms (write for nearest distributor).

Concentration by absorption, intermediate compound formation, poisoning of catalysts, negative catalysts, chain reactions, breaking of reaction chains are shown as factors which may be responsible for catalytic action.

Characteristics of Liquids. (9 min) 16sd. Brandon.

The properties of liquids, their forms; why surface film is manifested; the revelation of tension viscosity in drops, jets and bubbles; the properties and structure of matter are covered in this study.

Characteristics of Solids. (9 min) 16sd. Brandon.

Basic conceptions of nature of solids, and the physical laws governing them, are covered in this study of the characteristics of matter.

Chemical Reactions. (20 min) 16sd. Edit PS.

The nature of chemical reactions, relationship between nucleus and electrons, atom composition are illustrated in this film.

Chemistry & a Changing World. (11 min) 1940. 16sd-\$50. EBFilms (write for nearest distributor).

Points out chemistry's important place in the world, shows the work of research chemists and chemical engineers from the inception of electric furnace phosphorus to its many uses as a completed product.

Chemistry of Combustion. (1 reel) 16si-sd-\$22.50-\$30; rent-\$1-\$1.50. Edit PS.

A series of chemical experiments in the phenomena of oxidation and combustion.

Colloid. (30 min) 1938. 16si-\$35. Rolab.

Classifies most common types of colloids after given evidence of the multitude and variety of colloids. Shows how to produce colloids artificially. The Tyndall movement of ultra microscopic particles and production of colloids by electric arc; migration of particles in the electric field and physio-chemical reactions are shown.

Colloids. (10 min) 1938. 16sd. EBFilms (write for nearest distributor).

Colloidal suspensions: liquid in gas—fog; gas in liquid—whipped cream; solid in liquid—clay and india ink; liquid in liquid—mayonnaise.

Crystallization. (20 min) 16si-\$41.16; rent-\$2. Bray.

Microscopic views show crystals in form of icicles and snowflakes. Quartz, amethyst, and salt are shown. By experiments under the microscope is shown the formation of crystals, the peculiarities of growth and shape-determining factors.

Distillation. (13 min) 16sd. BIS.

A laboratory demonstration shows how a solid and two liquids having different boiling points may be separated by fractional distillation. Animated diagrams show how carbon and hydrogen atoms combine to form chains, rings, and combinations of both. How various ingredients of crude petroleum may be separated by boiling is diagrammed.

Doings of Turp & Tine. (15 min) 16si. Hercules.

Animated diagrams show the processes in production of both gum and wood turpentine.

Excursions in Science #7. (10 min) 1944. 16sd. GE.

Presentation of crystals, their characteristics and some of their uses. It shows how crystal structure can be used in identifying materials, how single crystals and metals differ in strength from multiple crystal structures; how thin wafers of quartz accurately cut and mounted in piezo oscillators control the wavelength of radio stations.

How Ether Anesthesia is Manufactured. (18 min) 16si. Mallinckrodt.

The chemical composition of ether anesthesia is shown graphically, with actual manufacturing process shown photographically and in animation.

In Nature's Workshop. (10 min) 16sd. rent-\$2. B & H.

Microscopic photography of snow and ice crystals. Examples of silicic acid, quartz, lime, amethyst, antimony glance crystals. Formation and growth of crystals formed from the following solutions: potassium chlorate, potassium bichromate, pyrogallie acid, table salt, salicylic acid, camphor, salicin, benzoic acid, cinnamon acid, etc.

Inside the Flame. 16sd. Cabot; Caravel.

Technical story of carbon black, its production and the development of the product.

Magic Key, The. (20 min) Dow.

A silent film with titles produced for the American Chemical Society to show the method of extracting bromine from sea water.

Molecular Theory of Matter. (10 min) 1932. 16sd-\$50. EBFilms (write for nearest distributor).

Molecular theory of matter—changes in states; behavior of matter in gaseous, liquid, and solid states; the Brownian movement.

Oxidation & Reduction. (10 min) 1932. 16sd. EBFilms.

Oxidation and reduction are shown in burning phosphorus in an experiment. Decomposition of mercury rust is done to discover the component of air responsible for the oxidation. Blast furnace operation shows process of reduction as does magnesium burning in dry ice.

Properties of Water. (11 min) 1941. 16sd. Coronet.

Experimental demonstrations illustrate physical and chemical properties of water; solubility of solids, liquids and gases in water; crystallization and super-saturation; energy changes of water to ice and to steam.

Story of Nitrocellulose. (45 min) 16si. Hercules.

The manufacture and uses of nitrocellulose.

Story of Sulphur. (10 min) 1936. 16sd-\$30; rent-\$1.50. (15 min) 1936. 16si-\$22.50; rent-\$1. Edit PS.

Story of sulphur from the drilling and blasting; into vats and tanks; loading onto cars for transportation. Experiments in using sulphur with other materials are illustrated.

Sulphur. (20 min) 1941. 16sd-loan. Texas Gulf in cooperation with USBM.

Story of sulphur from location of deposits through processes shown in animation.

Surface Chemistry. (33 min) 16sd-\$7.50. B & H.

Shows oil-film experiments demonstrating size and shape of molecules; demonstrates apparatus for studying surface films of oil, and explains research studies on the camphor boat, egg albumen, molecular measurements, and polarized light studies.

Velocity of Chemical Reactions. (10 min) 1937. 16sd-\$50. EBFilms (write for nearest distributor).

Describes with photography and animation, the effect of the nature, the concentration, and the temperature of reacting substances on the rate of chemical reactions. Practical examples with wood, aluminum, iron, and other substances are given to illustrate these phenomena. The dynamics of reversible reactions and of chemical equilibrium are shown by schematic drawings that give clear conceptions of rather abstruse processes.

S L I D E F I L M S

Atmosphere, The. \$2. Buskett-SVE.

Carbon & Its Oxides. \$2. Buskett-SVE.

Carbon, Calcium, etc. \$2. Vis Sci-SVE.

Chemistry & Chemical Engineering as a Career. \$2. SVE.

Chlorine & Its Compounds. \$2. Buskett-SVE.

Electrolysis, Reduction, Synthesis. \$2. Vis Sci-SVE.

Electron Theory. \$2. Vis Sci-SVE.

Facts & Laws. \$2. Buskett-SVE.

Foundations of chemistry.

Fire & Fuels. \$2. Buskett-SVE.

Ionization, Neutralization, Nitrogen Cycle, etc. \$2. Vis Sci-SVE.

Laws & Theories. \$2. Buskett-SVE.
Chemistry.

Metallurgy & Organic Chemistry. \$2. Vis Sci-SVE.

Metals & Non-Metals. \$2. Vis Sci-SVE.

Nitrogen, Compounds of. \$2. Buskett-SVE.

Oxygen & Hydrogen. \$2. Buskett-SVE.

Physical & Chemical Changes. \$2. Vis Sci-SVE.

Problems, Sulphur, Nomenclature, Formula Writing. \$2. Vis Sci-SVE.

Sulphur & Its Compounds. \$2. Buskett-SVE.

Water. \$2. Buskett-SVE.

Foundations of chemistry.

Electronics Industry

ELECTRONIC THEORY

MOTION PICTURES

Chemical Effects of Electricity. (15 min) 1930. 16si. EBFilms.

Shows making of dry cells, storage batteries, electric batteries. Covers electrolysis, electroplating, electrotyping, making copper anodes, producing aluminum from bauxite by electrolysis.

Coils & Electric Currents. (13 min) 16si-\$30; rent-\$1.50. Edit PS.

Explores the nature of the fields of force about a current-carrying wire and the theory of solenoids and electromagnets, induction coils, and electric motors.

Electrochemistry. (10 min) 16sd-\$50. EBFilms (write for nearest distributor).

Shows the chemical reactions as dynamic processes; shows electrolytic decomposition of hydrogen chloride. Storage battery integrates both processes.

Electrodynamics. (10 min) 16sd-\$50. EBFilms (write for nearest distributor).

Covers basic principles of electromagnetism and current electricity. Presents magnetic fields about wire carrying current and of a coil, electromagnets, magnetic hypothesis, AC and DC generators, induction by an electric current.

Electron, The—An Introduction. (16 min) 16sd-\$23.35. USOE-Castle. OE175.

Explains the nature of electrons, electron flow in solid conductors, electromotive force, control of electron flow, electron flow and magnetic fields, types of electron flow, and induced electron flow.

Electrons. (10 min) 16sd. EBFilms (write for nearest distributor).

By straight photography and animation, con-

duction of electricity in liquids, gases, and vacuums proves the hypothesis that electricity consists of a unit elementary charge, the electron.

Electrostatics. (10 min) 16sd-\$50. EBFilms (write for nearest distributor).

Static electricity is presented as fundamental to understanding of theory of electricity. Depicts positive and negative electrification with role of insulators and conductors.

Excursions in Science #1. (10 min) 1935. 16sd. GE.

Illustrates elementary principles of magnetism. Shows the affinity different oils have for water and shows how the photo-cell is based upon the principle of the simple radiometer. A small model is shown being driven by three photo-cells.

Excursions in Science #2. (10 min) 1936. 16sd. GE.

Illustrates the impractical though very interesting magnetic gears. Shows the practical application of the use of photo-electric cell in the photo-sorter. Details of the electric light bulb shown.

Excursions in Science #3. (10 min) 16sd. GE.

Presents two stories dealing with magnetism: one on the effect of strong magnets on weak magnets, and the electron theory of magnetism; the other the effect of cold and heat on the Curie metal used in control devices with alnico magnets.

Heat & Light From Electricity. (15 min) 16si. EBFilms (write for nearest distributor).

Deals with heating effects of electricity. Shows manufacture and use of conductors, insulators, heating equipment, arc furnaces, lamps. Presents Ohm's law; explains series and parallel circuits.

Magnetic Effects of Electricity. (15 min) 16si-\$50. EBFilms (write for nearest distributor).

The electromagnet, the electric bell, the ammeter, the volt meter used to explain magnetism and magnetic induction. Presents theory of permanent magnetism.

Primary Cell. (11 min) 16sd-\$50. EBFilms (write for nearest distributor).

Animation shows operation of dry cell in terms of electron action, including ionization of the electrolyte, polarization and depolarizer; batteries and cell in series and parallel wiring.

Principles of Current Electricity. (22 min) 16sd-\$63; rent-\$3. DeVry.

Shows relation between electrostatics and electric currents; fundamentals of current electricity by animated diagrams of electron movements; relation between voltage, resistance and current in an electrical circuit.

Principles of Current Generation. (22 min) 16sd-\$63; rent-\$4. DeVry.

Makes clear principles involved in generating electrical power; correlates practical and theoretical phenomenon of electric magnetic induction.

Principles of Electromagnetism. (22 min) 16sd-\$63; rent-\$3. DeVry.

Electro-magnetic phenomena. Relationship between current and magnetic fields. Coils and solenoids. Transformers.

Principles of Electrostatics. (22 min) 16sd-\$63; rent-\$3. DeVry.

Polarity, conductors, insulators. Electrostatic induction. Electron theory. Distribution of charges. Electric machines.

Principles of Magnetism. (22 min) 16sd-\$63; rent-\$3. DeVry.

Polarity, lines of force. Reluctance and permeability. Magnetic induction uses of magnets. Molecular theory of magnetism.

Radio Technician Training: Capacitance. (31 min) 1945. 16sd-\$27.80. Castle.

Shows flow of electrons through circuit; charging and discharging of condensers. Behavior of capacitance with alternating current.

Series & Parallel Circuits. (11 min) 16sd. EBFilms (write for nearest distributor).

Covers resistance, current and voltage in series circuits and in parallel circuits.

Storage Battery Power. (20 min) Edison.

Analytical study of storage batteries and the unique features of Edison's product.

Story of Electricity. (10 min) 16sd. rent-\$1.50. B & H.

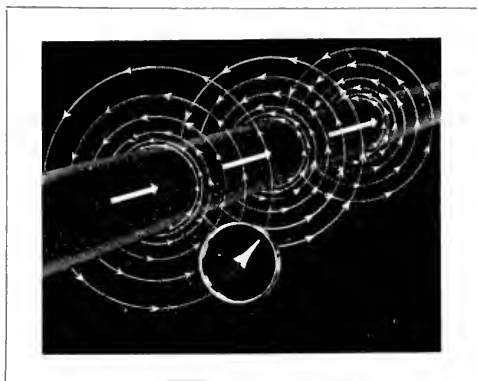
Lodestone, magnetized iron, amber, the earth itself in gigantic field. Franklin's kite, 1752. First motor, 1832. Morse telegraph. Edison lamp, 1879. Commercial power plant, 1883. Wireless, 1898. Modern uses.

Traveling Electric Waves. (50 min) 1936. 16si. MIT.

Behavior of electrical waves on a power transmission line; behavior of direct-current waves on an open line; behavior of direct current waves on short circuited and loaded lines.

What is Electricity? (20 min) 1944. 16sd. Westinghouse.

Animation shows movement of electrons, flow of current; basic facts of electricity covered; making and distribution.



The Electron—An Introduction

S L I D E F I L M S

Alternating Current. AAF-Castle. FS1-86.

An elementary introduction to principles of alternating current. Demonstrates and explains Lenz' Law, simple wave alternator; some discussion of frequency, effective value, voltage-current time relationship, and power.

Alternating Current. (90 frames) Jam Handy.

Inductance, capacitance and impedance in a circuit—transformers and rectifiers.

Current Generation—Parts I & II. \$2 each. Eye Gate House-SVE.

Electric Cell, The. (50 frames) Jam Handy.

The change of chemical energy into electrical energy. Primary and secondary cells.

Electricity. (31 frames) \$2. SVE.

Series of diagrams illustrating electrical principles and operations. Covers condensers, dry cell and storage cell, electrical units, Ohm's law, resistance, fuses, generators.

Electricity & the Storage Battery. Part 1. (95 frames) Jam Handy.

The most fundamental aspects of electricity. Principles of simple primary and secondary cell, Ohm's law, series and parallel connections.

Electricity & the Storage Battery. Part 2. (68 frames) Jam Handy.

The storage battery of secondary cells. General construction and operation.

Electrical Workers. \$2. SVE.

Electromagnetism. (94 frames) \$2. SVE.

Deals with direction of electric current and electron movements, lines of force, magnetic fields, simple electromagnets, properties of a hollow coil, polarity of a solenoid, and the use of electromagnets in generators and motors.

Electromagnetism. (56 frames) \$4.50. Jam Handy.

Construction and use of the electromagnet; effects of the electromagnetic field; Oersted's experiment; strength of fields, the polarity of a solenoid; the telegraph; Faraday's experiment.

Electrostatics—Part I. (64 frames) \$2. SVE.

Thales observed the first known fact concerning electricity, that rubbed amber draws light objects to itself. The film commences at this point and continues to explain, by means of pictures and diagrams, the nature of positive and negative charges. Defines conductors, nonconductors, and the function of insulators.

Electrostatics—Part II. (66 frames) \$2. SVE.

Explains the nature of electrification produced by induction. Shows how the electrophorus is used for generating electricity by induction.

Electrostatics—Part III. (71 frames) \$2. SVE.

Explains that all commercial electrostatic machines are elaborations of the electrophorus, generating electricity by induction rather than by friction. Illustrates the following: Two or more conductors separated by nonconducting material form a condenser; condensers can hold much more powerful charges than can their elements independently; charges attract and bind each other and thus reduce the scattering effect of the mutual repulsion of electrons; charges rapidly escape from points into the air.

Magnetism. (56 frames) \$4.50. Jam Handy.

The general properties and laws of magnets; magnetic effects; natural and artificial magnets; polarity and laws of magnetic attraction; magnetic fields; the compass; magnetic induction; theory of magnetism; magnetic materials.

Magnetism. (36 frames) \$2. SVE.

Explains magnetism, furnishing historical background. Presents theory of magnetism and defines lines of force and magnetic fields.

Magnetism. (36 slides) GE.

Elementary conceptions of magnetism and molecular theory of magnetism; the contributions of Faraday and Steinmetz to the study of the magnetic field.

Resistance. (27 frames) SVE.

Each picture illustrates a form of resistance using subjects common in our everyday life. Shows resistance by means of water and by means of copper wires. Explains the use of the rheostat and how resistance is measured.

Static Electricity. (73 frames) Jam Handy.

The electron theory of positive and negative charges.

GENERATORS & MOTORS

MOTION PICTURES

Assembly of Small Split-Phase Motors. (12 min) 16si-loan. Westinghouse.

Complete assembly of small split-phase type motor.

Corebuilding Low & High Tension Winding. (10 min) 1943. 16si. Westinghouse.

Shows generator core building, low and high tension winding techniques, the operation of small motor.

Current Flashes. (10 min) 16sd. Jam Handy.

Function of generator and battery explained.

Direct Current Controllers. (15 min) 16sd-\$23.22. USOE-Castle. OE388.

Shunt motors driving various types of equipment; direct current controllers in operation; animation of a starting and speed regulating direct current faceplate controller connected to a shunt motor.

Dynamotor Assembly & Inspection. (16 min) 16si-loan. Westinghouse.

Detailed study of dynamotor, its assembly and inspection.

Field Coil Winding. (8 min) 1943. 16si-loan. Westinghouse.

Shows operations of winding of motor and generator field coils for specified applications.

Induced Currents. (15 min) 1930. 16si-\$24. EBFilms (write for nearest distributor).

Animation and straight photography show: armatures, commutators, collector rings, telephones, mutual and self induction.

Manufacturing a Washing Machine Motor. (16 min) 16si. Westinghouse.

Shows steps in building this type motor, including centrifugal switch assembly.

Multiple Field Coil Winding. (10 min) 1943. 16si. Westinghouse.

Shows winding operations in small motors and generators for five field coils.

Rotating Magnetic Fields. (13 min) 16sd-\$19.65. USOE-Castle. OE384.

Illustrates rotating magnetic field pattern. Explains a two-pole, three-phase stator. Traces the three-phase winding in the demonstration stator. Shows the three factors that cause rotation of the magnetic field; sine curves indicate flow changes in a three-phase circuit; shows construction of polyphase motors.

Small Split-Phase Motor Stator Winding With Enameled Wire. (12 min) 16si-loan. Westinghouse.

Shows operation in detail.

Small Stator Winding & Connecting. (12 min) 16si-loan. Westinghouse.

Shows coil winding, main and auxiliary, and inserting operations in small stators.

Squirrel Cage Rotor Principles. (10 min) 16sd-\$16.42. USOE-Castle. OE385.

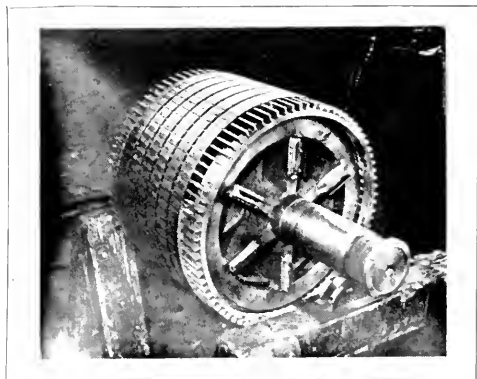
Explains fundamental law of magnetism; fundamental law of induced e.m.f. shows electron flow in squirrel-cage rotor setting up magnetic poles which create torque; construction of squirrel-cage rotors.

Stator Coil Winding By Machine. (8 min) 16si-loan. Westinghouse.

Describes five methods of high speed stator coil winding by machine.

Three Phase Stator Winding. (16 min) 16si-loan. Westinghouse.

Describes three phase motor stator winding operations.



Squirrel Cage Rotor Principles

Underground Raindrops. (40 min) 16sd. US Elec Motor.

Shows the latest manufacturing methods related to production of electric motors. Includes machine winding, and treating of motors.

Wound Rotor Controllers. (18 min) 16sd- \$24.52. USOE-Castle. OE391.

Wound rotor (slip-ring) motor principles; how a controller regulates resistance in secondary circuit; operation of faceplate controller; operation of drum-type, reversing controller; operation of automatic magnetic starter for a wound rotor motor.

S L I D E F I L M S

A.C. & D.C. Generators. (29 frames) si-\$2. SVE.

Questions and answers about generators are continued on successive frames. Shows pictures of hydro-electric plant. Has complete set of examination questions toward the end of set.

Electric Motors. (66 frames) Jam Handy.

Principles of the motor. Direct and alternating current motors. Universal motors.

Generator, The. (77 frames) Jam Handy.

Principles of the generator. Types. Generating direct and alternating currents.

Motors. (27 frames) \$2. SVE.

Principles of the electric motor. Demonstrates parts and uses. Contains problems and test questions.

Principles of the Electric Motor. (24 slides) AMNH.

Magnets; electro-magnets; commutator; electric motor; shunt wound and series wound motors; types of railway motors.

Repulsion Motors—Type SCR. GE.

Explains the characteristics of the Type SCR which is used in single-phase circuits.

ELECTRICAL MEASUREMENT

M O T I O N P I C T U R E S

Electrical Measurement. (4 reels) 16sd-si. DeVry.

Construction and operation of electric instruments. Needs of different measuring quantities.

Principles of Electrical Measurement. (22 min) 16sd-\$63; rent-\$3. DeVry.

Construction and operation of electrical instruments. Explains operations of number of electrical measuring devices.

When You Can Measure. (40 min) 1937. 16sd-\$80. GE.

Explains the use of electric measuring instruments and the development of modern types. Shows the accuracy of manufacture of parts and the precision assembly at the West Lynn plant.

S L I D E F I L M S

Alternating Current Voltmeters & Ammeters. (29 frames) SVE.

Diagrams and demonstrates principles on which AC meters work. Principles of ammeters and voltmeters and their parts. Demonstration of other types of AC meters, including the oscilloscope. Film ends with test questions.

TRAINING FILMS

Direct Current Voltmeters & Ammeters. (41 frames) SVE.

Discusses how to measure flow of electricity. Shows principles on which different meters operate. Labels these parts of portable meter. Demonstrates uses of ammeter and voltmeter. Ends with test questions.

Electric Meters. (83 frames) Jam Handy.

Construction and operation of various types of meters for electrical use.

Electrical Measurements. Part I. (76 frames) \$2. SVE.

Measurement—what it is; how we measure; principles of electric measurement.

Electrical Measurements. Part II. \$2. SVE.

Voltmeters and ammeters—construction and principles; shunts, voltmeters. Calibration of meters. "Zero corrector" used in adjustments.

Electrical Measurements. Part III. (87 frames) \$2. SVE.

Demonstrates principles on which voltmeter and ammeter coils operate; electro-dynamometer type of instruments.

Electrical Measurements. Part IV. (72 frames) \$2. SVE.

Power factor meters; frequency meters.

Electrical Measurements. Part V. (71 frames) \$2. SVE.

The direct-reading wattmeter; the synchroscope; the therm-ammeter.

Measuring Electrical Units—Part I. Navy-Castle. SN645a.

Describes the use and care of instruments for measuring resistance, voltage, and current.

Measuring Electrical Units—Part II. Navy-Castle. SN645b.

Describes the use and care of instruments for measuring capacity (condensers) and alternating current.

MOTOR MAINTENANCE & REPAIR

M O T I O N P I C T U R E S

D.C. Motor Part I: Mechanical Overhaul. (20 min) 16sd-\$27.74. USOE-Castle. OE392.

Shows how to test for mechanical and electrical faults; how to dismantle D.C. motor and record data; how to turn the commutator; how to clean and recondition parts; how to repair and replace field coils; how to assemble the motor; how to adjust and make final test on motor before returning to service.

D.C. Motor Part II: Rewinding. (37 min) 16sd-\$44.02. USOE-Castle. OE393.

Shows how to record data; how to dismantle and clean an armature core; how to determine commutator pitch; how to re-insulate the core; how to insert coil; how to band an armature; how to shape coil ends; how to lay in and solder leads; how to balance the armature; how to impregnate the armature; how to turn a commutator.

Repulsion-Induction Motor: General Overhaul. (18 min) 16sd-\$25.81. USOE-Castle. OE397.

Shows how to check a repulsion-induction motor for electrical and mechanical faults; how to dismantle a repulsion-induction motor; how to clean and plug the commutator; how to turn the commutator; how to remove a damaged sleeve bearing; how to ream to size and install

a new sleeve bearing; how to remove a damaged coil and how to wind and insulate a new coil; how to assemble and lubricate a repulsion-induction motor.

Safe Scientific Methods of Testing Armatures, Motors, Generators. (4 min) 1943. 16si. Westinghouse.

Demonstrates approved methods.

Split-Phase Motor: Rewinding. (28 min) 16sd-\$35.95. USOE-Castle. OE394.

Shows how to test a split phase motor for electrical and mechanical faults; how to record data necessary for accurate rewinding; how to dismantle a split-phase motor and strip the stator; how to rewind the stator by hand or by using a winding gun; how to form and install skein windings; how to insulate, lace, dip, and bake the stator; how to assemble, lubricate and test the motor.

Three-Phase Motor—Part I: Preparing to Rewind. (17 min) 16 sd-\$24.52. USOE-Castle. OE395.

Shows how to interpret and record nameplate data of a three phase motor; how to identify the line leads and finish leads; how to draw a three-phase delta connection diagram; how to indicate pole phase groups, number of poles, polarity of each phase group; how to remove coils and determine coil span; how to use coil winding machine; how to end-tape machine wound coils.

Three-Phase Motor—Part II: Rewinding. (17 min) 16sd-\$25.17. USOE-Castle. OE396.

Shows how to insert mush coils; how to insert separators or "willies"; how to fold, trim, and wedge slot insulation around windings; how to insert phase insulation; how to make a delta connection.

RADIO & COMMUNICATION

MOTION PICTURES

Air Wave. (10 min) 16sd. RCA-Ganz.

Radio receiver, from crystal set to modern tubes. Broadcasting a program.

Brazilian Quartz Goes to War. (10 min) 16sd. OIAA.

Indispensable element in manufacturing radio equipment, and one of Brazil's most important industrial products.

Cathode Ray Oscillograph. (2 reels) 16sd-si. Vis Lib.

Shows work of cathode ray oscillograph in radio direction finding and research.

Cathode Ray Tube. (6 min) 16sd. GE.

The director of GE Research Laboratory, Dr. D. W. Coolidge, presents the making and operation of these tubes and explains the effect of cathode rays on minerals.

Development of Communication. (11 min) 16sd. EBFilms.

Inventions which made possible instantaneous communication—the battery, ground connection, electromagnet, telephone and telegraph, cable, wireless radio.

Regarding Free Loan Films

Prints available for free loan are subject to quantity available; *order early*, allow for *optional dates* and return all films *promptly*. *Handle them with care*. Borrow only when a film is clearly useful in training.

Diode, The. (17 min) 16sd-\$24.60. USOE-Castle. OE176.

Explains the principle of electron flow across a gap; basic features of the diode tube; control of electron flow in the tube; photoelectric cells; X-ray tubes; the diode as rectifier.

Electronics at Work. (20 min) 1943. 16sd. Westinghouse.

Explains the six basic functions of electronic tubes and shows how each type of tube is used in industrial applications. Animated drawings showing tube construction are used to explain how the cathode, anode and grid elements rectify, amplify, generate, control, transform light into electric current and transform electric current into light. Precipitron, radio and radio-telephone, high frequency induction heating, television are used to show how the tubes perform.

Electrons on Parade. (20 min) 1942. 16sd-loan. RCA; Ganz.

Shows basic construction and function of the radio receiving tube and complete process of manufacturing and testing tube. Shows usual and special applications of vacuum tubes.

Excursions in Science #4. (10 min) 1939. 16sd. GE.

Demonstrates the "electric eye" or photo-tube. Shows how photo-tube makes sound movies possible.

Excursions in Science #5. (10 min) 1940. 16sd. GE.

Illustrates odd phenomena created in laboratories, liquid air, magnetic thickness gages, cathode ray oscillograph.

Getting Together. (10 min) AT&T.

A march of the parts which make our modern telephone, done in stop-motion.

Listen—It's FM. (20 min) 1941. 16sd-color. GE.

Explains the scientific principles of frequency modulation.

Modern Aladdin's Lamp, A. (20 min) 1940. 16sd-free loan. West Elec.

Development of the modern vacuum tube, how it is made, its applications in everyday life with particular reference to its uses as a repeater tube in telephone circuits.

Radio Antennas: Creation & Behavior of Radio Waves. (12 min) 16sd-\$10.26. AAF-Castle. TF1-474.

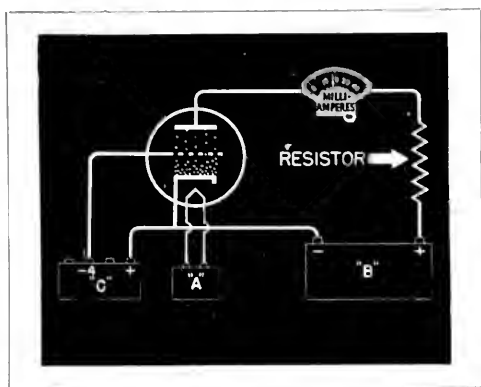
Depicts electric and magnetic fields, generation of electro-magnetic waves, behavior of radio waves in space, ground wave, reflection and refraction, the ionosphere, the causes of fading.

Radio Receivers: Principles of Radio Receivers. (17 min) 16sd-\$16.41. AAF-Castle. TF1-472.

Portrays the principles and working of typical radio receivers including crystal and tube detectors, radio and audio frequency amplification, and the super-heterodyne circuit.

Receiving Radio Messages. (11 min) 16sd-\$50. EBFilms.

Principles of radio receiver shown by animated drawings; capacity of variable condenser, problem of tuning, the inductance of the coil and resonance are explained.



The Triode: Amplification (see below).

Recording & Reproduction of Sound for Motion Pictures, The. (30 min) Elec Research.

A technical explanation, combining photography and animated drawings, showing various methods and improvements in recording and reproduction of sound.

Safeguarding the Speechways. (20 min) West, Elec.

Presenting the care of manufacture and the control of quality which insure the dependable service of our communication system.

Sending Radio Messages. (10 min) 16sd-\$50. EBFilms.

Sound waves, direct currents, alternating currents, voice current, carrier wave and amplification as basis of radio are explained, with microphone, transformer and the modulator shown in operation.

Triode, The: Amplification. (14 min) 16sd-\$21.95. USOE-Castle. OE177.

Reviews diode principle; electric field in a diode; electric field in a triode; a triode amplifier circuit; amplification of D.C. voltage changes; amplification of alternating voltages; distortion; amplification of audio frequency signals; triode principle.

Vacuum Tubes. (11 min) 16sd-\$50. EBFilms.

Animated drawings show the way in which vacuum tubes work. The three functions of the vacuum tube in radio are explained; how it serves in amplifying current to operate the loud-speaker, how it is used as a rectifier in detection, and how it is used as an oscillator tube in the transmission station to produce the carrier wave.

Vacuum Tubes: Electron Theory & the Diode Tube. (16 min) 16sd-\$15.25. AAF-Castle. TF1170.

Explains electron behavior in matter, electron sources in vacuum tubes, symbols of tubes, functioning of tube in a circuit, effect of plate voltage changes, space charge, and diode and duo-diode as reflectors.

Yesterday & Today. (10 min) 16sd. Elec. Research.

Shows developments in sound recording and reproduction from the old Edison type phonograph up to date, culminating in the Western Electric Wide Range Sound System.

S L I D E F I L M S

Audio Frequency Amplification. Navy-Castle. SN652.

Describes theory and practice of amplification of the audio wave.

Capacitive Reactance. Navy-Castle. SN648.

Explains the basic theory of capacitive reactance and its application to radio instruments.

Inductive Reactance. Navy-Castle. SN647.

Explains the basic theory of inductive reactance and its application to radio instruments.

Radio Frequency Amplification. Navy-Castle. SN653.

Describes the theory and practice of amplification of the detected radio wave.

Reproducers. Navy-Castle. SN654.

Describes the construction and operation of headphones and loudspeakers.

Sound Pictures. \$2. SVE.

Television. \$2. SVE.

Vacuum Tubes. Navy-Castle. SN650.

Describes the theory of operation of vacuum tubes, and their function in the radio circuit.

WIRING

MOTION PICTURES

Cable Surface Wiring. (17 min) 16sd-\$24.60. USOE-Castle. OE377.

Shows how to make an electrical entrance to a building; the need for providing fuse protection in circuit; how to install nonmetallic sheathed cable; how to handle and install porcelain fittings; how to support and connect cable to meet requirements of the National Electric Code; how to prepare and connect wires for service.

Electrical Circuit Faults. (19 min) 16sd-\$26.16. USOE-Castle. OE375.

Shows how to test for and locate common circuit faults; explanation of electron flow through fused and grounded circuits; how to test for and locate grounds, resistance deterioration and interference in circuits.

Elements of Electric Circuits. (11 min) 1943. 16sd-EBFilms.

Shows the nature of electric currents and circuits. Animated drawings and straight photography explain motions of electrons, conductors, insulators and resistance factors.

Installation of 69KV Oil-Filled Cable. (21 min) 16sd. GE.

Shows modern methods of installing.

Installing Conduit. (25 min) 16sd-\$32.73. USOE-Castle. OE381.

Shows planning the job; bending electrical metallic tubing; installing the metallic tubing runs; bending rigid conduit; installing rigid conduit runs; using flexible conduit.

Installing Surface Metal Raceway. (22 min) 16sd-\$29.67. USOE-Castle. OE380.

Shows how to plan the job; how to use molding raceway fittings; how to install a molding raceway run to ceiling outlet; how to install a run from ceiling outlet to wall switch; how to install run from ceiling outlet to wall fan; how to install run to floor outlet.

Joining Solid Conductors. (22 min) 16sd-\$29.02. USOE-Castle. OE369.

Shows how to remove insulation from a wire and how to clean the conductor; how to make a Western Union, pigtail, plain tap, "wrapped tap" or Britannia, loop tap, and fixture joints; how to care for and use a blow torch; how to flux and solder joints; how to insulate joints with rubber tape and with friction tape.

Oil-Filled Cable. (41 min) 16-35sd. GE.

Technical depiction of the processes used in manufacture of this cable.

Porcelain Protected Surface Wiring. (19 min) 16sd-\$25.85. USOE-Castle. OE376.

Shows how to make an electrical entrance to a building; the need for providing fuse protection in circuit; how to install wiring and porcelain fitting; how to support and insulate wires to meet requirement of the National Electric Code; how to prepare and connect wires for service.

Power Bending Conduit. (17 min) 16sd-\$25.17. USOE-Castle. OE382

Shows how to assemble and operate a floor bender; how to assemble and operate a portable bender; how to make a 45 degree bend in 3" conduit; how to make an offset in 1½" conduit; how to make an offset in conduit already installed.

Preparing Old Buildings for Wiring. (21 min) 16sd-\$28.38. USOE-Castle. OE378.

Visualizing the obstructions and planning wire paths; shows preparing the paths for the wiring runs.

Roughing-In Non-Metallic Sheathed Cable. (24 min) 16sd-\$32.08. USOE-Castle. OE373.

Shows planning the installation of the runs; circuit run, switch run, wall receptacle run; how to determine the location of required runs; how to install an offset bar hanger and ceiling outlet box; how to rough-in a circuit run, using non-metallic sheathed cable; how to make up connections for switches; receptacles, and fixtures.

Soldering Lugs & Splicing Stranded Conductors. (18 min) 16sd-\$25.81. USOE-Castle. OE371.

Shows how to solder a lug, using electric soldering tongs; how to solder a lug, using blow torch; how to solder a lug, using solder pot and ladle; how to splice stranded conductors, using a split, solder sleeve; how to make a served cable splice.

Three-Wire Service Entrance. (24 min) 16sd-\$31.44. USOE-Castle. OE374.

Shows how to mount and connect an outdoor meter connection box; how to mount and con-

nect a service control box; how to ground a three-wire service entrance installation; how to install concentric service entrance cable.

Voices Wrapped in Paper. (10 min) West. Elec.

The manufacture of telephone lines and the insulation method.

Wire Sizes and Voltage Drop. (13 min) 16sd-\$19.65. USOE-Castle. OE372.

Shows factors influencing ability of conductors to carry electron flow; measuring wire sizes; figuring circular mil area; explaining voltage drop; locating voltage drop and correcting; illustrating Ohm's Law.

Wiring Old Buildings With Armored Cable. (22 min) 16sd-\$29.02. USOE-Castle. OE379.

Reviews steps in preparing a building for wiring; shows how to install a ceiling outlet with a plaster ring; how to install outlet boxes; how to cut and strip armor from cable; how to attach cable to outlet boxes; how to run armored cable; how to repair openings in walls; how to join conductors at ceiling outlet.

S L I D E F I L M S

Cables. \$2. SVE.

MISCELLANEOUS

M O T I O N P I C T U R E S

Across-The-Line Starters. (15 min) 16sd-\$22.58. USOE-Castle. OE389.

Theory and operation of the manually operated thermal overload switch; theory and operation of the magnetically operated across-the-line starter; theory and operation of the drum reversing switch for a three phase motor; theory and operation of the magnetic reversing switch.

Electric Heat in Industry. (45 min) 16si-apply for loan. GE.

Use of electric heat in various processes in manufacturing.

Reduced Voltage Starters. (23 min) 16sd-\$30.79. USOE-Castle. OE390.

Principle of the transformer; mechanical operation of the manual starting compensator; electrical operation of the manual starting compensator; operation of the thermal overload relay; Mechanical and electrical operation of an automatic starting compensator.

Theory & Operation of the Eight Pole Rotating Magnet & Secondary Condenser. (27 min) 1944. 16sd. Scintilla; Bendix.

How a particular type of "Scintilla" aircraft magneto works.

Theory & Operation of the Four Pole Rotating Magnet. (42 min) 1944. 16sd. Scintilla; Bendix.

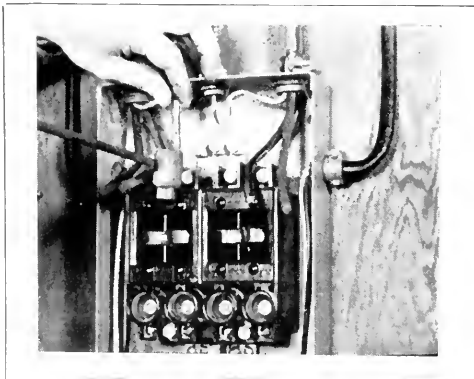
How a particular type of "Scintilla" magneto works.

There's a Difference. (40 min) 16sd. GE.

Story of development, modernization and manufacture of electrical transformer.

Unseen Worlds. (11 min) 16sd. Ganz.

Shows the elementary theory of the electron microscope; its operations and the vast field of microscopic exploration this instrument makes possible.



Three Wire Service Entrance (see above).

World's Largest Electrical Workshop. (30 min) 16sd. GE.

Drs. Langmuir, Whitney, and Coolidge are shown in their laboratories. Equipment ranging from giant turbines to small domestic devices are shown in progress of construction.

S L I D E F I L M S

All-Electric Ship, The. (39 slides) GE.

A complete picture and description of electric ship propulsion, and the conveniences of modern all-electric ship.

Applications (Part I). (60 frames) Jam Handy.

Heating and lighting.

Applications (Part II). (56 frames) Jam Handy.

Electrical Engineering as a Career. \$2. SVE.

Electricity at Work. \$2. Long-SVE.

Manufacture of the Incandescent Lamp. (30 slides) rental plus transportation. Ind U.

The processes in the manufacture of incan-

descent lamps. Making tungsten filament; blaz- ing lead wires; bulb making machine; exhausting air from lamp; attaching base; the finished lamp.

Operation & Use of Transformers, The. (32 frames) \$2. SVE.

Shows principles and parts of the transformer; covers use of transformers in stepping down volt- age for ordinary use. Review diagrams at end.

Storage Battery, The. (83 frames) Jam Handy.

The construction and use of the commercial storage battery.

Transformers. (26 slides) GE.

Various types of transformers; annealing fur- nace; winding disk coils; high voltage testing machine for sheet insulation; legs and bottom yokes; interlocking legs and yoke laminations, large one and two phase core-type transformers.

Transformers. \$2. Long-SVE.

X-Ray, The. (55 slides) GE.

Development of the X-ray; construction of the X-ray tubes; applications of the use of X-ray tubes; use of X-ray in identification of diamonds; industrial applications.

Engineering

CIVIL ENGINEERING

MOTION PICTURES

Bridging San Francisco Bay. (22 min) 1943. 16sd. US Steel.

From the planning to the completion of 43,500 feet which span the navigable waterway from San Francisco to Oakland, the film shows step by step the sinking of the foundations, construction of super structure, cable spinning, splicing, pouring the concrete for the roadways.

Building the Golden Gate Bridge. (40 min) 16sd. Bethlehem.

Construction of the bridge shown with em- phasis on pre-fabrication of units and their em- placement. Shows finishing of the base plates, erection of trusses, and, briefly, the weaving of cables, deck and stringers.

Collapse of the Tacoma Narrows Bridge. (30 min) 1941. 16si-\$125-color; rent-\$10. Camera.

Shows construction of the bridge and its com- plete collapse.

Constructing a Pipe Line River Crossing for Power Transmission Lines. (15 min) 16si. Linde.

Shows construction of pipe line river crossing beginning with lining up operation and ending with pulling of pipe strings across the river.

Explosive Engineer, The. (30 min) 16si. Hercules.

Shows testing to determine whether explosives may be used, the rate of detonation, and strength of dynamite. The second part covers use of ex- plosives in mining, quarrying, construction, and submarine blasting.

Greatest Airship Dock. (10 min) 16si. Good- year.

Story of largest building in world without interior supports.

Norris Dam Construction. (30 min) 1936. 16si-loan. TVA.

Shows the construction of the Clinch River

dam. Includes some technical detail.

S L I D E F I L M S

Civil Engineering as a Career. \$2. SVE.

DRAFTING—DESIGN BLUEPRINTS

MOTION PICTURES

Auxiliary Views. (15 min) 16si. Purdue U.

Procedures for drawing straight and curved line views and for determining necessity of aux- iliary views is shown.

Behind the Shop Drawing. (20 min) 16sd. Jam Handy.

After a series of pictures to show the impor- tance of shop drawings, the narrator discusses perspective drawing with moving pictures show- ing the points made. The method of making the drawing is shown step by step, pictured by ani- mated lines, arrows and transparent paper so that the reason for each line can be understood. Drawing of more complicated objects are ex- plained as drawings are shown. A section is de- voted to blueprints.

Capital Letters. (20 min) 16sd. Purdue U.

Shows the construction of single stroke, in- clined commercial gothic capital letters, amper- sand and numerals on ruled grids.

Derivation of Involute Profiles. (15 min) 16si. NYU, College of Engineering.

A step by step derivation of involute tooth profiles made from a pair of pulleys and a crossed belt. Shows how points in the belt, in moving from a point of tangency on one pulley to a point of tangency on the other, generate the conjugate involutes on both pulleys.

Development of Surfaces. (15 min) 16si. Purdue U.

Models and drawings show the construction of patterns of surfaces. Describes methods for right and oblique prisms, right cylinders, pyramids and cones, oblique cones.

Drafting Tips. (28 min) 1943. 16sd-\$65; rent-\$2 plus transportation. Penn State.

Procedures in developing a drawing; use and care of drafting equipment are covered.

Free Hand Drawing. (15 min) 16si. Purdue U.

Illustrates lines: short and long horizontal, vertical, and inclined lines, large and small circles and ellipse. Proper strokes for sketching various lines are shown. Demonstrates sharpening of the drawing pencil.

Industrial Design. (10 min) 16si-color-sale or loan. Knaus.

Shows step by step procedure in designing a radio cabinet, from the first "thumbnail" sketch to the finished drawing, featuring airbrush technique.

Ink Work & Tracing. (30 min) 16si. Purdue U.

Demonstrates the steps involved in making ink tracing on cloth. Shows the preparation and manipulation of tools and materials, the order of inking, the use of the proper widths of lines for different purposes. Demonstrates correction of mistakes.

Instruments and Materials. (18 min) 16si-color. Ill Tech.

Technical drawing with properly arranged drawing table and use of drawing instruments.

Intersection of Surfaces. (15 min) 16si. Purdue U, General Engineering Dept.

Demonstrates procedures for finding intersections of right, oblique and curved surfaces.

Lofting & Layout. (30 min) 16sd. Navy.

Shows how the designers' small original drawings are made into full size layout on metal sheets. Animated drawings show the development of the plane from pencil sketch to production line.

Lower Case Letters. (13 min) 16st. Purdue U.

Demonstrates construction of each lower case letter. After each demonstration, time is allowed student to make letter.

Making a Master Contour Template. (18 min) 16sd-\$25.22. USOE-Castle. OE125.

Shows what a master contour template is and its purpose; how to transfer a line from a lines-board to a piece of sheet metal, using ducks, spline, and a roller line pickup to make the transfer; what beam lines are and how to locate them; what bevels are; how to measure and record the bevel angles; and the importance of frequent check for accuracy.

Mock-Up & Tooling. (30 min) 16sd. Navy.

Demonstrates some typical methods used for rapid and economical production of templates, dies, jigs, fixtures and other tools.

Multiview Drawing. (30 min) 16si. Purdue U, General Engineering Dept.

By use of models, demonstrates representation of object by means of orthographic views. Shows use of scale for making measurements and the use of the T-square and triangles for constructing the views. Demonstrates technique of transferring a measurement from one view to another

or of constructing a third view by projecting from the other two views.

Orthographic Projection. (30 min) 16si. Purdue U, General Engineering Dept.

A demonstration, with models, of the proper methods for representing objects on paper with the three orthographic views. Shows how to transfer dimensions and use the instruments.

Practical Geometry. (10 min) 16sd-\$40; rent-\$2. Knowledge.

Visualizes the mathematic applications of basic geometry. Illustrates the relationship of the perpendicular with the ordinary plumb bob and square.

Principal Dimensions, Reference Surfaces & Tolerances. (12 min) 16sd-\$17.97. USOE-Castle. OE53.

Shows the relationship between the blueprint and a rough and finished casting; how to compare casting dimensions with blueprint specifications; how a cross-section view is derived from a full view; how to use a blueprint as an aid in selecting reference surfaces from which to take other dimensions; how to interpret tolerances; how to use a blueprint in checking the accuracy of finished work.

Reading a Drawing of a Valve Bonnet. (20 min) 16sd-\$27.09. USOE-Castle. OE55.

Shows how to interpret conventional symbols and tolerance specifications, and the conventional views and cross-sectional views shown on a blueprint of a fairly elaborate workpiece; how to use the blue print as a guide in planning machine operations; how to obtain dimensions not given directly on the blueprint and apply them in laying-out and performing work.

Reading a Three-View Drawing. (10 min) 16sd-\$16.42. USOE-Castle. OE52.

The use of blueprints to visualize objects, the interpretation of a blueprint, and the making of a tool block according to a blueprint are explained.

Sectional Views. (15 min) 16si. Purdue U, General Engineering Dept.

By means of models demonstrates principles of sectioning, transparent cutting planes; shows full, half, and off-set sectional drawings.

Sectional Views & Projections, Finish Marks. (15 min) 16sd-\$22.11. USOE-Castle. OE54.

Shows the different types of lines—dimensions, center, cross-section, and object; the projection of sectional view; the locations and uses of finish marks; the meanings of standard cross-section lines denoting types of materials.

Sheet Metal Work. (20 min) 1941. 16si. Gutlohn.

Reading of blueprints, using drafting instruments, including the procedures and techniques, shown in close-up. Three basic projects illustrated: drag truss fitting, flange reinforcement, I-beam spar.

Screw Threads. (23 min) 16si. Purdue U.

Defines by means of models and drawing the important terms associated with screw threads. Complete step by step construction of national thread and square threads are shown. The meaning of each line of the drawing is explained by reference to a model.

Structural Drawing. (20 min) 16si. Purdue U, General Engineering Dept.

Shows preparation and use of chisel-pointed pencil in making pencil tracings, order of performing the various steps so as to secure accu-

Purchase Sources of Training Films

Listings in these pages include many *purchase* sources where prints are available for outright sale as well as rental in some instances. Wherever possible rates are included; otherwise write the library, school or commercial distributor for latest price lists, etc.

rate and fast results in the making of a structural drawing. Layout of a roof truss and detailing of a gusset plate are shown.

Template Reproduction. (20 min) 16sd. Navy.

Shows modern methods of reproducing drawings on metal, including photographic, X-ray, and electro-chemical processes.

Uses of T-Square & Triangles. (11 min) 16si. Purdue U.

Shows placing of drawings on drawing board; handling T-square, triangles and pencil; drawing horizontal, vertical and inclined lines with T-square and triangle. Drawing of perpendicular and parallel lines using triangles, and the construction of angles.

Visualizing an Object. (9 min) 16sd-\$15.78. USOE-Castle. OE51.

Shows the development of a blueprint, dimensioning by different views, use of various kinds of lines, and methods of indicating special information on blueprints.

S L I D E F I L M S

Drawing an Anchor Plate. (25 pictures-20 frames) Jam Handy.

List and pictures of tools needed; set-up on the drawing board; layout of center-line and indication of holes and complete horizontal dimensions; layout of verticals; layout holes with arcs and circles; drawing horizontal object lines; drawing vertical object lines; drawing in diagonal; darkening object lines, and extension and dimension lines light; drawing dimension arrowheads and lettering the plate.

Drafting Training. (56 frames) Consolidated Vultee.

Elementary picture showing the use of drafting tools, including pencil, T-square, triangles, scales, dividers, compass, french curves, inking, and special instruments.

Engineer's Relation to Production. (146 frames) sd. Tradefilms.

Correlates design problems of drafting with tasks of operators in fabrication departments. Broad coverage of shop practice in both sheet metal and machine shop is given, illustrating uses and limitations of equipment and how to meet engineering problems thus incurred. Also covers problems of finishes and processes.

How to Develop an Intersection: Part I. Navy-Castle. SN1036a.

Shows how to make a true layout for a flat pattern of a 2" cylinder, 8" in length, one end elliptical and both ends flanged.

How to Develop an Intersection: Part II. Navy-Castle. SN1036b.

Demonstrates the steps in laying out, forming and assembling a filler neck and collar to the end of a metal tank with the aid of machines and hand tools.

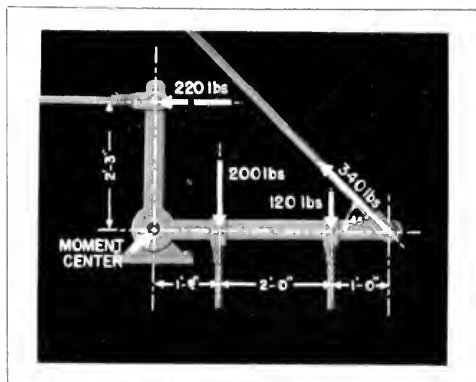
Mechanical Drawing. \$5. Twogood-SVE.

A complete course of study in mechanical drawing for beginners on any level.

Mechanical Engineering as a Career. \$2. SVE.

Metal Drawings. sd. Lockheed.

Shows the steps in the detail assembly template process, and many engineering and tooling applications are suggested.



Principles of Moments (see below).

Scales & Models. (80 pictures-83 frames) Jam Handy.

The story behind scales and models; bringing "too big" and "too small" into easy focus; how to plan, use and understand these valuable aids.

Simple Calculations for Flat Layouts. Navy-Castle. SN1035.

Describes several procedures to follow in calculating and laying out on paper and constructing metal parts from such designs as flanges, bends, beads, seams, and joggles. Both straight photography and drawings are used.

"T" Squares & Triangles—Part I. (31 pictures-32 frames) Jam Handy.

Fundamental uses of a "T" square and the 45 degree and 30-60 degree triangles; tools and equipment needed and correct care and usage; setting up for drawing; reproducing margins and title block of standard drawing form; correct use of hands, pencil, triangle, and "T" square in drawing margins; layout of title block.

"T" Square & Triangles—Part II. (60 pictures-53 frames) Jam Handy.

Manipulation of triangle to obtain angle lines; constructing of figure 1 with pencil, "T" square, 45 degree triangle and rule; layout of vertical and horizontal lines; layout of angle lines; construction of figure 2, using different triangle; duplication of figure 1; drawing figure 4, a hexagon; drawing figure 5; drawing figure 6, another hexagon.

MATHEMATICS

MOTION PICTURES

Introduction to Vectors. (22 min) 16sd. USOE-Castle. OE361.

Explains the meaning of scalar and vector quantities; how to add scalars and vectors; the various methods of vector composition and vector resolution; the relationship between vector composition and vector resolution; clarifies the relationship between the analytical and graphical methods of vector composition and vector resolution; shows how vectors may be employed to solve engineering problems.

Principles of Moments. (23 min) 16sd-\$30.79. USOE-Castle. OE362.

Visualizes the development of the concept of moment of a force and shows how the formula for finding its numerical value is derived; explains meaning and significance of the principle of moments. Principle of moments is shown to apply to all coplanar force systems.

Rectilinear Co-ordinates. (12 min) 16sd. rent-\$1.50. B & H.

Demonstration of Descartes' theorem, point, line, plane, and solid; number-scale, co-ordinates, plus and minus, axes, and 3-dimensional locations, and relationships.

Slide Rule, The (Multiplication and Division). (24 min) 16sd-\$30.67. USOE-Castle. OE179.

Explains in detail the "C" and "D" scales of the slide rule, the parts and markings of the rule, and shows how to use these scales for multiplication, division, and combinations of these two operations. Filmstrip reviews and includes material for practice in reading various scale positions and the rule settings.

Slide Rule, The (Percentage, Proportion, Squares, & Square Roots) (21 min) 16sd-\$27.71. USOE-Castle. OE354.

Shows how to use the "B" and "C" scales of slide rule to calculate proportions and percentages; how to calculate squares and square roots; how to determine placing of decimals after square root is extracted. Simple problems illustrate methods.

Verniers. (19 min) 16sd-\$25.85. USOE-Castle. OE4.

A detailed study (largely animation) of the principles of the vernier scale and its application to precision measuring instruments. Shows the use of vernier calipers and micrometers on different kinds of work.

S L I D E F I L M S

Analytic Geometry. (36 pictures-44 frames) Jam Handy.

Quadratic equations; writing the equation for easy graphing; drawing board methods in graphing.

Basic Definition of Algebra. \$2. SVE.

Calculation Instruments: Business Machines—Early Methods. \$2. SVE.

Calculation Instruments: Graphical Methods, Slide Rules, & Solving Equations. \$2. SVE.

Circle, The—Chords & Arcs. \$2. Muir-SVE.

Circle, The—Measurement of Angles. \$2. Muir-SVE.

Circle, The—Tangents & Secants. \$2. Muir-SVE.

Construction. (57 pictures-62 frames) Jam Handy.

The basic principles of geometric construction.

Geometric Construction—Part I. (43 pictures-41 frames) Jam Handy.

Material and tools needed and importance of using them correctly; how to draw a perpendicular bisector to a base line; dropping a perpendicular from a prick punch mark; bisecting an angle; drawing perpendicular at the end of a line; drawing a parallel line; layout of fillets between intersecting lines.

Geometric Construction—Part II. (36 pictures-35 frames) Jam Handy.

Laying out of fillets between a line and a circle or arc; duplicating an angle with compass and straight edge; dividing a line; laying out of angles with a protractor.

Introduction to Plane Geometry. \$2. Muir-SVE.

Origin of Algebra, The. \$2. SVE.

Plotting Graphs. (62 pictures-69 frames) Jam Handy.

Visualizing the equation; constants and how they change the picture; simultaneous equations and their solution.

Rectilinear Figures—Angles & Triangles. \$2. Muir-SVE.

Rectilinear Figures—Polygons & Locus of a Point. \$2. Muir-SVE.

Rectilinear Figures—Quadrilaterals & Polygons. \$2. Muir-SVE.

Rectilinear Figures—Triangles. \$2. Muir-SVE.

Rectilinear Figures—Triangles & Parallel Lines. \$2. Muir-SVE.

MEASURING AND TESTING

M O T I O N P I C T U R E S

Flue Gas Analysis (Orsat Apparatus). (19 min) 16sd-\$25.85. USOE-Castle. OE367.

Shows how to set up the Orsat gas analyzer; how to draw in an air-free sample of flue gas; how to absorb and measure the amounts of carbon dioxide, oxygen, and carbon monoxide in the sample; how to calculate the amount of nitrogen.

Measurement With Light Waves. (15 min) 16sd-\$22.73. USOE-Castle. OE174.

Explains the principles of measurement with light waves—the nature of light waves; the reflection and refraction of monochromatic light by a glass surface; the cause of interference bands; the use of these bands in ultra-precision measurement; and their translation into millionths of an inch. Demonstrates procedures in gage block inspection—the comparison of gage block for height; the meaning of circular and parallel bands on gage surfaces; the precautions necessary in measurement with light waves; and the inspection procedures followed. The film strip in addition to reviewing the picture, provides practice in interpreting band arrangement.

Tension Testing. (21 min) 16sd-\$27.71. USOE-Castle. OE348.

Shows how a hydraulic tension testing machine operates; how to prepare the machine and a specimen for a test; how to conduct test to determine the specimen's elastic limit, yield point, and ultimate strength; how to record, plot the data to determine the modulus of elasticity.

Treating & Testing. (40 min) 16sd. Bethlehem.

Wire drawing. Special testing procedures. Close-ups of inspectors at work. Preparation of steel for re-rolling. Animated time-temperature charts showing heat treating sequences. Standard spark testing procedure. Stop motion photographs of sparks held at the characteristic point to indicate presence of various alloys.

X-Ray Inspection. (21 min) 16sd-\$27.71. USOE-Castle. OE173.

Shows the use of radiographs in industry, generation of X-rays in X-ray tube; wave nature of X-rays, relation of voltage to wave length, relation of wave length to penetrative power, relation of exposure time to penetrative power, procedure in making radiographs, and interpretation of radiographs for defects in metals. Filmstrip provides practice in the identification of defects in metals.

S L I D E F I L M S

Angular Measurement. (68 pictures-76 frames) Jam Handy.

The systems of angular measurements, degrees and radians, as they are related to each other.

How to Use the Micrometer. sd-\$6; si-\$3.50. Ross Roy.

Information on how to read, use, and care for a micrometer.

Measurement Instruments—In the Laboratory. \$2. SVE.

Measurement Instruments—Outside the Laboratory. \$2. SVE.

Measurements & Measuring—Part I. (50 pictures-38 frames) Jam Handy.

The standard of measurement; work accuracy; discussion of the steel scale and its variation;

dividers and calipers.

Measurements & Measuring—Part II. (64 pictures-57 frames) Jam Handy.

The micrometer; how it works, how to read it; discussions of the vernier scale principle; gauges and gage blocks.

Properties of Metals—Part I. (70 pictures-64 frames) Jam Handy.

Definition—alloys—properties: strength, elasticity, toughness, ductility, malleability, brittleness, hardness, fusibility, corrosion, resistance are explained. How metals are tested to determine how much of each of these properties they possess. Working metal. Heat treating.

Rule, The. (57 frames) sale-\$10. Service Engraving in cooperation with Detroit Board of Education.

Elementary presentation of appearance, reading, and use of various types of precision rules.

Engines

DIESEL ENGINES

MOTION PICTURES

Construction of the Diesel Engine, The. (17 min) 16sd-\$15.83. Navy-Castle. MN43.

The general structure of several types of diesel engines and the different frame types, cylinder parts, pistons, piston rings, connecting rods, crankshafts, bearings, camshafts and rocker assemblies are shown by cross-sectional animated drawings and straight photography.

Diesel. (33 min) 1936. 16sd-free loan. Int'l Harvester.

Animated drawings show the operations of the diesel engine, the fuel supply, making parts of the engine, assembly and lubrication.

Diesel Engine, The. (29 min) 16sd-\$26.65. Navy-Castle. MN42a.

An introductory survey film shows how ignition may be achieved by compression, basic diesel engine types, and forms of air headers and fuel injectors, diesels pictured are types commonly used in submarines.

Diesel Engine Governors—Part I: Woodworth Governors. (14 min) 16-d-\$13.52. Navy-Castle. MN44a.

Shows the basic principles of operation of diesel engine governors and explains the operations of overspeed, over speed trips, and regulat-

ing governors. Both straight photography and cross-sectional animation used.

Diesel Engine Governors: GM Series 71—Limiting Speed Mechanical Governor. (12 min) 16sd-\$10.84. Navy Castle. MN44b.

Discusses three main assemblies of the governor and their functions. Reviews the operation of the manual fuel control to explain the action of the governor through low, intermediate and high speed ranges.

Diesel—The Modern Power. (20 min) 1937. 16sd. GM.

The story of the development and principles of the modern diesel engine shown in animation demonstrating its operation. Shows uses in streamlined trains, switching engines, boats, and power houses.

Diesel Simplicity. (10 min) 16sd. Caterpillar.

Principles and operation of diesel engine shown by animated diagrams.

INTERNAL COMBUSTION
(See also *Aircraft Power Plant, p. 11;*
and Automotive Industry-Engines,
p. 25)

MOTION PICTURES

Cyclone Combustion. (30 min) 16sd. Wright.

Treatment of the theory of combustion in a four cycle gasoline engine of the aviation type shown in animation and straight photography. Covers generally the manufacture of the engine, inspection and tests necessary in the building of precision engines.

Free Air. (9 min) 16sd-\$36. Jam Handy.

Oxidation, the burning fuel in the internal combustion engine. Visualization of vaporization and mixture of gasoline with air.

Fire Control. (10 min) 16sd. Jam Handy.

The control of internal combustion. Animated diagrams and cutaway engines show how the modern cylinder head has been designed to provide efficient fire control.

Hot Head, The. (10 min) 16sd. Jam Handy.

Four stroke cycle principle of the internal combustion engine explained by animated drawings and cutaway models.



X-Ray Inspection (see Col. 2, Page 40).



Molding a Valve Body (see Col. 2, Page 43).

Power Within — Construction, Operation, and Care of the Internal Combustion Engine. (30 min) 1937. 16si. (19 min) 1940. 16sd. GM in cooperation with USBM.

Shows experiments to find proper fuel for use in internal combustion engine. Shows disassembled parts of automobile engine and then, by animated photography, the assembling of each.

Where Mileage Begins. (20 min) GM.

The story of the internal combustion and the modern motor car.

S L I D E F I L M S

Carburetor, The. (179 pictures-146 frames) 1941. si. Jam Handy.

Basic principles involved in carburetion, including atomization and vaporization. The air-fuel ratio. Designs and devices used in carburetors.

Cooling System, The. (83 pictures-73 frames) Jam Handy.

Thermo-siphon systems, pump systems, bypasses and thermostats.

Four-Stroke Cycle Internal Combustion Engine (Part I). (44 pictures-42 frames) Jam Handy.

Elementary principles of the engine, including the cylinder, piston, crankshaft, and flywheel. The four-stroke cycle principle.

Four-Stroke Cycle Internal Combustion Engine (Part 2). (83 pictures-71 frames) Jam Handy.

Continuing the principles to include valve mechanisms, camshaft, mechanical timing and differences in basic cylinder head designs: L-head, valve-in-head, etc.

Fuel Feed Systems. (58 pictures-56 frames) Jam Handy.

Gravity feed, pressure feed vacuum tanks, and mechanical pumps.

Fuels & Engines of the Future. 35-sd. Florez.

This film is a forecast of the changes in engines that are likely to come about as a result of improvements in fuel.

Higher Power Top Inch, The. Perfect Circle.

A complete story of the importance and function of piston rings in an internal combustion engine. The effect of piston rings on efficiency of engine performance.

Multiple Cylinder Engines. (81 pictures-48 frames) Jam Handy.

Applying the principles to engines of more than one cylinder, and explaining some of the refinements of the modern engine.

Principles of Internal Combustion Engine. si. Castle.

Demonstrates how an engine converts heat energy into mechanical energy. Explains the parts of the combustion engine.

Valve Operating Mechanisms. (78 pictures-76 frames) Jam Handy.

Definition and purpose of valve in an internal combustion engine—position of valves in four engine strokes—characteristics of various valves and valve operating parts—functions of valve operating parts—valve positions in relation to engine operation—valve timing.

STEAM ENGINES

MOTION PICTURES

Magic of Steam, The.—Part I. (18 min) 1944. 16sd. Allis Chalmers.

Shows construction, operation and maintenance of the modern steam turbine.

Steam Turbines. (20 min) 16-35sd. GE.

Principles and operation of the steam turbine.

Magic of Steam, The.—Part II. (14 min) 1944. 16sd. Allis Chalmers.

Theory of condensation and operation of surface condenser.

Tornado in a Box. (28 min) 1944. 16sd. Allis Chalmers.

The development and operation of the gas turbine in picture and animation.

Foundry & Forging Practice

GENERAL

MOTION PICTURES

Flow of Metals Into Molds. (30 min) 16si-color. Mechanite.

A study of the effects of shaping and placing gates and risers in various patterns and molds; cooling rates and flow rates studied. Shows making of cores, filling of open face molds. Foundrymen's drawings are used to explain and illustrate the process.

Manufacture of Dies. (10 min) 16sd-color. Allegheny Ludlum.

Shows manufacture of lamination dies from Huron High Carbon—High Chromium die steel.

Story of the Chilled Car Wheel. (20 min) 16sd. Griffen.

Shows step-by-step processes in making chilled car wheels; from pattern shop to molding floor, to coring ovens, to furnace. Illustrates testing and research involved.

S L I D E F I L M S

Molding & Coremaking. \$2. SVE.

DIE CASTING

MOTION PICTURES

Die Casting. (35 min) 16sd-color. N J Zinc.

A technical film showing all phases of die casting processes from the tooling of the dies to the fields of usefulness for die castings of zinc and other alloys.

Die Casting the Super High Pressure Way. (45 min) 16sd. Harvill.

A complete picture of die casting showing the methods of producing precision dies, the action and operation of the die casting machines, and the products produced.

FORGING

MOTION PICTURES

Forge Welding. (12 min) 16sd-\$18.36. USOE-Castle. OE192.

Shows how to maintain a clean, deep, hot fire; heat mild steel for forging; upset and scarf round stock; make a lap weld; and shape and hammer-refine the weld.

Forging & Upsetting Machines. (4 reels) 16sd-si. Nat'l Machinery.

Shows the company's machines in actual forging and upsetting operations.

Forging With a Hand Forge. (13 min) 16sd-\$19.65. USOE-Castle. OE191.

Demonstrates building an open fire in a forge, laying out and marking stock, heating steel, and forging an eye.

MELTING PRACTICE

MOTION PICTURES

Charging & Operating a Cupola. (14 min) 1945. 16sd-\$21.95. USOE-Castle. OE437.

The essential parts of the cupola and how they function; safety precautions to be used on the job; how to fire, charge, and operate a cupola; the cycle of operations involved in the melting process.

Preparing a Cupola for Charging. (21 min) 1945. 16sd-\$28.38. USOE-Castle. OE436.

How to recognize the end of a heat; how dropping bottom is performed; how a cupola is prepared for its next heat.

MOLDING—BENCH

MOTION PICTURES

Foundry Work. (4 reels) 16si-sd. Purdue U. General Engineering Dept.

Shows operations in making a water-jacket gas-engine cylinder, molding, core making, smelting and pouring.

Making A Simple Core. (15 min) 16sd-\$22.11. USOE-Castle. OE424.

Shows how to prepare a suitable sand for core-making; how to make a small cylindrical core in either one or two pieces; how cores are baked; how to assemble a two-piece core; how to locate a vertical core in a mold and provide necessary venting; how core gases escape when mold is poured.

Molding Part Having a Vertical Core. (19 min) 16sd-\$26.47. USOE-Castle. OE125.

Shows how to identify the parts of a pattern which indicate how cores are to be placed; how to mold the drag and cope halves; how to mold a gate and riser instead of cutting them; why and how a pouring basin is made; how to draw a pattern with a "molder's touch"; how to vent a mold so as to permit the escape of core gases; how to locate a vertical core in the mold.

Molding With a Gated Pattern. (11 min) 16sd-\$17.35. USOE-Castle. OE427.

Shows what a gated pattern is and why it is used; how a match or follow board may simplify making a parting; how facing sand is prepared and used; and how and why some patterns are rapped through the cope.

Molding With a Loose Pattern. (Bench) (21 min) 16sd-\$27.71. USOE-Castle. OE123.

Shows how to identify and use common bench molder's tools; how molding sand is prepared; how to face a pattern; how to ram and vent a mold; how to roll a drag; how to cut a sprue, runner, gates, and riser; how to swab, rap, and draw a pattern; and, by animation, what takes place inside a mold during pouring.

Molding With a Split Pattern. (19 min) 16sd-\$25.85. USOE-Castle. OE126.

Shows why split patterns are used; how ramming effects the permeability of sand in a mold; how to mold the drag and cope; reinforce a mold with nails; how to patch a mold.

MOLDING—FLOOR

MOTION PICTURES

Molding a Horizontal Cored Part. (22 min) 1945. 16sd-\$29.67. USOE-Castle. OE131.

Shows use of a horizontal core; use of a split pattern; use of chaplets and chaplet supports; how to gate a mold for rapid pouring of thin casting; how to clean a casting.

Molding a Valve Body. (26 min) 1945. 16sd-\$33.36. USOE-Castle. OE430.

Shows use of a split pattern and multipart dry sand core; how nails are used to reinforce pockets and hanging bodies of sand; how to gate a mold for rapid, uniform distribution of clean metal; how to locate a core and seal the core prints. Explains purpose and use of a runner box.

Molding Part With Deep Green Sand Core. (25 min) 1945. 16sd-\$32.73. USOE-Castle. OE429.

Explains why to use a follow board with a thin, box-like pattern; shows how to reinforce a green sand core with nails; how to locate sprue and watch-up pins; how to use gagers; how to ram and vent a green sand core which must permit the escape of a considerable volume of gases.

Molding With a Loose Pattern. (Floor) (21 min) 1945. 16sd-\$32.08. USOE-Castle. OE428.

Explains distinction between bench molding and floor molding; shows how to locate a pattern to facilitate making the parting; how to face a deep pattern; how to ram a drag and walk it off; how to clamp a mold; shows why crossbars are necessary in the cope; shows how to locate sprues and risers, using spotters; how to tuck the crossbars of a large cope.

Molding With a Three Part Flask. (35 min) 1945. 16sd-\$42.74. USOE-Castle. OE432.

Shows use of a deep follow board; technique

of facing, ramming, and venting a deep green sand core; use of a cheek in a three-part flask. Explains purpose and method of step-gating.

MOLDING—MACHINE

MOTION PICTURES

Molding on a Jolt Roll-Over Pattern Draw Machine. (23 min) 1945. 16sd-\$30.79. USOE-Castle. OE434.

Explains the principles of the jolt roll-over pattern draw machine; shows how to place the flask on the roll-over table; how to fill the drag and jolt it; how to clamp the flask to the roll-

over table; how to roll the mold over; how to draw the pattern; how to set the drag and cope pattern plates on master mold board; how to fill the cope and jolt it; how to adjust air clamps; how to finish and close the mold.

Molding On a Jolt Squeeze Machine. (10 min) 1945. 16sd-\$17.07. USOE-Castle. OE433.

Explains the principles of the jolt squeeze molding machine; the nature of the match plate. Shows how to attach the air vibrator; how to fit the flask and match plate together; how to check the squeeze head clearance; how to fill the drag and jolt it; how to roll the mold; how to fill the cope and apply press board; how to squeeze the mold; how to draw the pattern, finish and close the mold.

Hydraulics

MOTION PICTURES

Basic Hydraulics. (10 min) 1914. 16sd-color. Adel.

Shows hydraulics in use in aircraft, in the home; proportions and amplifications of force; inverse ratio and area.

Flow. (30 min) 16sd. Castle.

Shows control of flow of liquids and gases by correct valves; casting operations; tests for strain and stress; gauges in use; types of valves.

Flow, The Story of Valves. (10 min) 16sd-free loan. Crane; B & H.

Shows modern industry using the latest mechanical devices to achieve economic production in a trip through Crane Company.

Fluid Flow in Hydraulic Systems. (11 min) 1944. 16sd-color. Adel.

Properties of fluids, their application to hydraulics; density and viscosity of liquids; types of flow and their control shown in animation.

Fluid Highway Control. (20 min) 16sd-restricted loan-apply. Jenkins.

Film deals with valves and valve application; shows basic variations and features in valve design; globe, gate, check and special valves and their uses.

Hydraulics. (13 min) 16sd-\$15.50; rent-50c. BIS.

Film shows applications of the principles of hydraulics. In simple experiment shows that liquids are inelastic and cannot be compressed.

Hydraulics. (10 min) 16sd. Jam Handy.

Basic principles of hydraulic pressure. How

liquids are used to transmit power. Working models and laboratory experiments visualize the fundamentals of hydraulic pressure. Utilization of hydraulic pressure.

Life Lines of Industry. (28 min) 1945. 16sd-B & W. Castle.

This film deals with the research, production, inspection and distribution of products used in the valve and fitting, and plumbing and heating industries.

Pumps. (15 min) 16si-color. Quimby.

Shows modern features of pumps, screw, rotating, and centrifugal with uses of each.

Valves, Their Manufacture & Use. (30 min) 1938. 16si-sd. Crane, in cooperation with USBM.

Technical film showing close-up views and cross sections of various valves, their manufacture, including forging of poppet, butterfly, check and gate valves.

S L I D E F I L M S

Hydraulic Mechanisms. Navy-Castle. SN111.

Explains the principles of a hydraulic system, shows the three types of pumps and the pressure control type of relief valve which are used in hydraulic systems and explains their operations.

Principles of Liquids & Gases. AAF-Castle. FS1-22.

A discussion of basic physical principles as applied to liquids and gases, together with illustration of their application to the hydraulic system of the airplanes.

Industrial Relations

CUSTOMER RESEARCH

MOTION PICTURES

Science in Business. (16 min) 16sd. March of Time Production for GM.

The value of Gallup polls, customer research, Fortune surveys, to industry; the testing of public reaction and acceptance of new product.

LABOR-MANAGEMENT RELATIONS

MOTION PICTURES

Behind the Scenes in the Machine Age. (3 reels) 16sl. USDL.

The part that women play in modern industry; human waste in industry; convenience for workers; safety first; types of labor-saving machines.

Machine, Master or Slave. (14 min) 1941. 16sd. Educational Film Institute, NYU.

The problems which technological progress has brought to management and to labor are considered.

Manpower, Music & Morale. (15 min) 1944. 16sd. RCA—Ganz.

The use of music in industry, stressing the accomplishments of scientifically planned programs in modern plants.

Partners in Production. (28 min) 1944. 16sd. Made in Britain by NFBC who distributes as does BIS.

With an incident at a north country coal mine as its kernel the film outlines the story of the Joint Action Committees in Britain. There are certain differences between the functions of these committees and American Labor-Management Committees.

Tyneside Story. (15 min) 16sd. BIS.

One of the derelict shipyards on Tyneside affected by the drastic slump in shipping which followed the last war. It was opened and staffed in a unique manner and was soon sending ships to sea again.



Instructing the Worker on the Job

Instructing the Worker on the Job. (14 min) 16sd-\$21.49. USOE-Castle. OE155.

A new girl worker is told how to do a job on the drill press. She fails to master the job and is then shown how to do it. This does not work and in distress she leaves the machine. The supervisor then does a careful job of instructing the next girl who becomes a competent worker. Thus the difference between telling, showing and instructing is made clear.

Introducing the New Worker to His Job. (16 min) 16sd-\$23.35. USOE-Castle. OE154.

A new worker is being started on his job. First, the induction is done very poorly. This becomes apparent as the new worker shows considerable dissatisfaction with his treatment. Then, the same job is done over again correctly. The difference between the first and second ways of inducing the worker is obvious.

It's Our Job. (35 min) 16sd. Pratt Whitney Division, United Air.

Problems foremen must meet and means of solving them. Covers problems from introducing new worker to cooperating with other foremen.

Maintaining Good Working Conditions. (9 min) 16sd-\$15.48. USOE-Castle. OE152.

Several cases where improvement in working conditions resulted in increased production and better satisfied workers are enacted. The importance of the part played by supervisors in maintaining good working conditions is emphasized.

Maintaining Quality Standards. (10 min) 16sd-\$16.73. USOE-Castle. OE164.

Various scenes emphasize the nature of quality standards. The role of the supervisor in maintaining quality as well as quantity is made clear by incidents involving poor instructions, carelessness, and lack of pride in good workmanship.

Maintaining Workers Interest. (13 min) 16sd-\$19.21. USOE-Castle. OE159.

Various workers are shown doing poor work because their jobs hold no interest for them. The point is made that the supervisor should be alert to detect and remedy these situations whenever possible.

New Supervisor Takes a Look at His Job, A. (13 min) 16sd-\$19.21. USOE-Castle. OE150.

A young workman has just been made a line supervisor. In an interview with the superintendent he is shown that in his new job, he must learn to get results by working with people instead of machines. The importance of the human element in supervision is brought out.

SUPERVISION

MOTION PICTURES

Combat Team. (35 min) 16sd. United Aircraft-Navy.

This film deals with the foreman and his problems.

Employing Blind Workers in Industry. (17 min) 16sd-\$23.98. USOE-Castle. OE165.

Many blind persons can be employed to advantage in industrial plants. The role of the Placement Specialists for Blind Workers is emphasized and types of jobs, safety factors and important points in supervision in connection with blind workers are shown.

Every Minute Counts (Lateness, Loafing, Absenteeism). (10 min) 16sd-\$16.73. USOE-Castle. OE161.

A supervisor becomes worried because of absenteeism and tardiness in his department. His superintendent points out many of the causes, and the supervisor takes steps to remedy them.

Ford Rouge Plant. (30 min) Ford.

Illustrating the control and simplicity of mass production in the world's greatest industrial unit.

Improving the Job. (9 min) 16sd-\$16.11. USOE-Castle. OE163.

A supervisor asks one of his workmen for suggestions for preventing waste. The workman explains the situation to members of his family at home and methods of improving the job so as to prevent waste are brought out.

Instructing the Blind Worker on the Job. (17 min) 16sd-\$23.98. USOE-Castle. OE166.

A blind person is given instruction on production drill press job by an expert instructor. He is made familiar with a twist drill and the drill press. He is shown a safe path for his hands in carrying out the operations involved. He learns quickly under good instruction and soon becomes a competent operator.

Passing the Know-How Along. (Training within industry) (15 min) 16sd. Jam Handy.

Demonstrates seven tested and logical steps that help in passing along job information. Training technique as applied to lathe operation are shown, but the principles apply to bench work, drill presses, welding, punch presses, sheet metal work, paint spraying, assembly, any work in factory.

Placing the Right Man on the Job. (13 min) 16sd-\$19.21. USOE-Castle. OE156.

Several workers who are misfits on the jobs they are doing are reassigned to different jobs resulting in happier workers and increased production. The necessity for taking into account individual differences is clearly indicated.

Planning & Laying Out Work. (10 min) 16sd-\$16.73. USOE-Castle. OE151.

A number of dramatized incidents point out the importance of careful planning before starting a job. The serious results of poor planning or no planning at all are demonstrated.

Power of a Minute. (15 min) 16sd. Dartnell.

A morale film which shows the fatal effect of delays along the production line.

Production Control. (20 min) 16sd-color. N. Amer. Aviation.

Shows the function of the production control department at North American.

Safety in the Shop. (12 min) 16sd-\$19.00. USOE-Castle. OE481.

Shows three accident cases in which safety factors are important. Indicates supervisor's responsibilities in enforcing safety measures; also points out how the training for a job should not only tell of safety precautions but demonstrate them.

Supervising Women Workers. (11 min) 16sd-\$17.35. USOE-Castle. OE158.

A line supervisor discusses with a foreman, his problem in supervising the women of his department. The fact is brought out that the same rules apply in supervising both men and women. Women, however, haven't the same background of industrial experience and very often have more home responsibilities than men. These facts must be taken into account by the supervisor.

Supervising Workers on the Job. (10 min) 16sd-\$16.73. USOE-Castle. OE157.

Various kinds of poor supervision practices are shown, among them, nagging, snooping, etc. By dramatized incidents, the poor results of these methods are made apparent and the better ways indicated.

Supervisor as a Leader, The—Part I. (14 min) 16sd-\$21.49. USOE-Castle. OE168.

Several workmen are asked what they consider to be the qualifications of a good supervisor. To them the four most important are: always keep promises, never take credit for someone else's work, don't pass the buck, don't play favorites.

Supervisor as a Leader, The—Part II. (13 min) 16sd-\$19.21. USOE-Castle. OE169.

Four supervisors discuss the qualities of leadership. Dramatized incidents make clear what they mean. One man lets his job go to his head. Another goes to pieces under pressure, he can't control himself. In other incidents, it is pointed out that the good supervisor is not afraid to praise his men for work well done and that he is loyal to them.

Using Visual Aids in Training. (14 min) 16sd-\$21.49. USOE-Castle. OE167.

An instructor, teaching his class the use of the micrometer, follows a carefully planned procedure involving the use of a visual aids unit; that is, a training motion picture, a coordinated filmstrip, and an instructor's manual.

Working With Other Supervisors. (8 min) 16sd-\$14.24. USOE-Castle. OE153.

Several supervisors discuss Larry, one of their colleagues, who has been unable to work harmoniously with them. The question is raised—What can be done about Larry?

S L I D E F I L M S

All Together. (87 frames) sd. MacVeagh.

Demonstrates the necessity for team work. Shows the loss of time, money, customer goodwill, and future business caused by lack of cooperation between departments.

Big Little Things. (81 pictures-78 frames) sd. Jam Handy.

Here the general subject of ideas, suggestions, complaints, and grievances is taken up with successful ways to listen to them, so that men will be satisfied. It also explains how to do something about these opinions of workers.

Fair & Cool. (67 pictures-67 frames) sd. Jam Handy.

This subject covers the supervisor's or foreman's responsibility for and obligations to his men. Many suggestions and tips for handling men tactfully and diplomatically are also made. The audience sees and hears how men react to good direction.

Foreman Training. (6 slide films) sd. Commercial.

Created from actual tested experiences of foremen and supervisors. 1. All Together; 2. Safety Pays; 3. Men at Work; 4. Nickels and Dimes; 5. Figures and Facts; 6. This Way Up.

Men at Work. (97 frames) sd. MacVeagh.

Discussion by a superintendent of the qualifications for leadership, the prerequisites of successful foremanship.

New Men at Home. (73 pictures-72 frames) sd. Jam Handy.

The timely subject of new men on the job is discussed in this slide film. The supervisor's or foreman's obligation to the new employee with suggestions to make him feel at home on the job and consequently take pride in his job is also discussed.



The Supervisor as a Leader—Part II

Preparing for the Future. (66 pictures-65 frames) sd. Jam Handy.

This sound slide film explains to the supervisor or foreman why it is important to develop qualified understudies to put himself in line for promotion. Suggestions for selecting and developing these understudies are also advanced.

Safety for Sale. (73 pictures-74 frames) sd. Jam Handy.

The supervisor's or foreman's responsibility in the plant safety program is explained. The constant need for alertness is pointed out. Effective ways of continually reminding men how to avoid dangerous practices are vividly shown.

Supervisory Development Program. (12 parts) sd. Vocafilm.

Series A: (6 parts) Each of these films presents a basic problem in human relations. It outlines the effect upon the man of improper handling, and suggests methods of avoiding mistakes. Included with films and discs are a conference leader's guide; six discussion manuals, foreman's notebook listing the acceptable procedures.

1. **Right Medicine, The.** Proper use of the reprimand. Shows a foreman who sets out to discover how to give a reprimand so that it will correct the fault, yet leave the man a better workman.
2. **Let's Talk Things Over.** Dramatizes mistakes that occur frequently; how to avoid them.
3. **Balanced Job, The.** Shows how to setup and use a day-by-day working schedule that allows for proper balance of all activities.
4. **It Takes Time.** Today's requirements for leadership. A step-by-step plan that will add to the stature of any foreman and help him gain his men's confidence.
5. **When Something Goes Wrong.** Getting to the bottom of a man's difficulties with his job. Shows how to spot the trouble and then how to correct the trouble.
6. **Stitch in Time, A.** Handling grievances at their start. Develops a four-step technique for handling employee problems.

Series B: (6 parts) This series provides a time-saving instrument for training men quickly. The vital business of breaking in new men and retraining experienced men. This job training series includes a conference leader's guide, six discussion manuals, and a foreman's notebook.

1. **Off to the Right Start.** Inducting the new man.
2. **There's a Job to Be Done.** Preparing to teach a job.
3. **One Step at a Time.** How to teach a job.
4. **Let's Face the Facts.** The supervisor's responsibility for safety. This film introduces a safety program from an entirely new angle.
5. **Do the Job Right.** Follow through on safety. Develops the new safety program, pointing out how to maintain men's interest in safety by developing habit forming attitudes.
6. **Man Behind the Machine, The.** Getting results. This film outlines some of the problems encountered in upgrading and retraining.

This Way Up. (98 frames) sd. MacVeagh.

Outlines the responsibility of supervision in preparing men for advancement.

To Bee or Not to Bee—Fables for Foremen. (10 min) sd-color. Lockheed.

This film tells the story of Benny Bumblebee, who goes to work in an aircraft plant, and outwits a lazy foreman.

Worm's Turn, The. (10 min) sd-color. Lockheed.

A fable for foremen, about an angleworm who, because he is commended for being an expert in "fribbelage," decides he is an expert in everything, and gives so much advice to other departments that a freak plane results.

TIME AND MOTION STUDY MOTION PICTURES

Assembly of Parts for Rubber Boots & Shoes. (15 min) 16si. Iowa State.

Time and motion study of the assembly of padded buckles and assembly of boot legs.

Assembly of Small Parts, The. (9 min) 16si. U. of Ia.^{1, 2}

a. Bolt and washer assembly (53%); b. refrigerator door knob assembly (143%); c. burring angle plate (45%).

Automatic Packaging Machinery. (60 min) 16si. Standard Knapp.

Motion study and analysis of installations of automatic machinery in the operations of packaging, canning and bottling equipment.

Better Methods—Less Fatigue—Increased Earnings—Lower Costs. (10 min) 16si. Methods.

Five different methods are shown, each more effective than the preceding one, in a single operation to demonstrate steady improvement as result of methods study.

Carding & Packing Steel Pins. (14 min) 16si. U. of Ia.¹

Correct Working Methods. (33 min) 16si. Methods.

Shows principles of effective working methods; illustrates principles of motion economy and work simplification.

Cresting Letters on Glasses. (11 min) 16si. U. of Ia.^{1, 2} (140%)

Demonstrations in Reaction Time. (6 min) 16si. U. of Ia.¹

Effective Working Methods. (9 min) 16si. Methods.

Result of motion study shown in "before" and "after" pictures of one inspection and two small assembly operations.

Extractor Operations in a Commercial Laundry. (11 min) 16si. U. of Ia.¹

Time and Motion study of these operations.

Folding and Packing Operations. (4 min) 16si. U. of Ia.¹

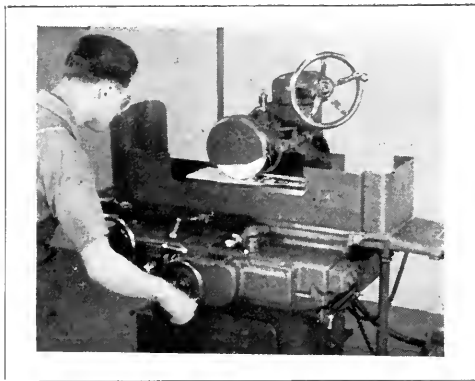
a) Folding packing papers (45%); b) Placing book in shipping carton and sealing carton with tape (22%); (43% less tape used).

Forging & Machine Shop Operations. (15 min) 16si. U. of Ia.^{1, 2}

a) Forge gear blanks (40% reduction in time); b) Assembling 5HP line starter (60%); c) Crimp end of leads (48%); d) Profile (35%); e) Inspect gear bushing (68%).

¹University of Iowa Time and Motion Studies by the Industrial Engineering Laboratory.

²Percentage figures in parentheses indicate the increase in output resulting from application of principles of motion economy.



Grinding a Parallel Bar—Part I

Forming Links for Portable Typewriters.
(3 min) 16si. U of Ia.¹

Time and Motion analysis of this operation.

Industrial Motion Analysis. (15 min) 16si.
College Film.

Six occupations in garment factories analyzed with workers working by time clock.

Inserting Liner & Partition in Paper Boxes.
(7 min) 16si. U of Ia.^{1, 2}

Time study of operation (63%).

Inspecting & Small Assembly Operations.
(12 min) 16si. Iowa State.²

a) Assembling two latches with bolt and nut (34%); b) Wrapping thread on stripped end of lead to prevent fraying (87%); c) Assembling meter register cam shaft (44%); d) General view of meter assembly operations (70%).

Investigation of Some Hand Motions, An.
(8 min) 16si. U of Ia.¹

a) Study of time required to grasp machine screws from various types of bins; b) Study of time required to position pins in bushings with beveled holes; c) A study of time used to position small blocks.

Job Analysis. (16 min) 16si. Methods.

"Before" and "after" pictures of a variety of miscellaneous operations which illustrate the specific accomplishments of applying the nine steps of job analysis.

Job Simplification Through Motion Study.
(16 min) 16si. Methods.

"Before" and "after" pictures showing the results of the application of the principles of motion economy to a variety of industrial operations.

Knitting Mill Operations. (19 min) 16si.
Iowa State.²

a) Collection of looping waste (55% saving); b) Spot inspection of hose (18% saving); c) Final inspection of hose (20% saving).

Material Handling Methods. (25 min) 16si.
Methods.

Pictorial demonstration of material handling methods used by present day industry.

Modern Methods. (19 min) 16si. Methods.

"Before" and "after" pictures of a variety of miscellaneous operations which were materially improved as the result of job analysis.

Motion Study Application. 16si. U of Ia.^{1, 2}

a) Definition of fundamental motions; b) Pin board study (40%); c) Folding paper cartons (100%); d) Assembly of ice cube tray grids

(36%); e) Inserting paper in mailing envelopes (114%).

Motion Study Applied to Factory Cleanup.
(6 min) 16si. U of Ia.^{1, 2}

100% increased output.

Motion Study Economy. (67 min) 16si-color.
Saginaw.

An excellent presentation of various ways of improving efficiency by building motion economy principles into standard or special machinery. The picture shows a score of various machines in their original and revised set-ups, explaining in detail such improvement, its time or motion saving results, and the reasons for each. Prepared by the man who rebuilt most of the equipment in this division.

Motion Study Principles. (22 min) 1941.
16sd-rent-\$4. U of Ia.¹

The assembly of three washers onto a bolt is used; the refrigerator door knob assembly shows how foot operated fixtures relieve the hands of work, make the job easier, and save time. Shows how smooth, curved motions may be substituted for abrupt changes in direction resulting in a better and easier method.

Miscellaneous Research Studies. (7 min)
16si. U of Ia.¹

a) Study of the effect of practice on various motions used in repetitive operations: 1) A study of pin gauging; 2) A study of screwdriver work. b) The assembly of washers onto pins. c) Gauging pins and disposing at varying distances. d) A study of simultaneous symmetrical and asymmetrical hand motions in one plane.

Painting Refrigerator Units With Spray Gun. (4 min) 16si. Iowa State.

Time and Motion study.

Pin Board Study. (3 min) 16si. U of Ia.^{1, 2}
(40%).

Shipping Room Operations. (7 min) 16si.
U of Ia.¹

Job analysis.

Shirt Finishing Method, A. (8 min) U of Ia.^{1, 2}

Application of principles of motion economy increased output 34%.

Skill & Effort Rating. (8 min) 16si. Methods.
Illustrations of different degrees of skill and effort exerted by industrial workers.

Soldering & Small Assembly Operation. (14 min) 16si. U of Ia.^{1, 2}

a) Removing insulation from wire (72%); b) Placing leads in commutator (30%); c) Assembling lead to current coil spool (78%); d) Soldering lead to copper shield (51%); e) Assembling synchronous motor armature shaft (71%).

Sorting Operations. (6 min) 16si. Iowa State.²

a) A study of invoice ticket sorting—one-handed vs. two-handed method; b) A study of invoice ticket sorting—table top sort vs. depressed bin sort (25%).

Study of Eye & Hand Movements in Inspection Work. (9 min) 16si. U of Ia.¹

Study of Simultaneous Symmetrical & Asymmetrical Hand Motions in Three Planes, A.
(8 min) 16si. U of Ia.¹
(Title self-explanatory).

Study of Symmetrical Simultaneous Hand Motions, A. (8 min.) 16si. U of Ia.

This film shows how the overall effectiveness of the worker can be improved by arranging his workplace so that he can perform with both hands in a simultaneous fashion, the therbligs of which the task consists.

Study of Two-Handed Work With Variations in Weights & Transport Distances. (13 min) 16si. Iowa State.

1939 Summer Management Course. (14 min) 16si-color. U of Ia.^{1, 2}

a) Activities of group attending course; b) Assembling and adjusting hair curlers (102%); c) Inspecting and packing toy railroad ties (27%); d) Refrigerator door knob assembly (143%).

1940 Summer Management Course. (16 min) 16si-color. U of Ia.¹

a) Activities of group attending course; b) Placing ampoules in cartons; c) Packing bottles

in cartons; d) Assembly of motor bracket.

1941 Summer Management Course. (27 min) 16si-color. U of Ia.^{1, 2}

a) Activities of group attending course; b) Packaging tape belts; c) Folding paper cartons (100%); d) Wind tape and attach to pin pads (146%); e) Packaging screws and washers (49%); f) Packaging ampoules; g) Assembly of ice cube tray grids (36%).

Theoretical Problem in Time & Motion Study, A. (15 min) 16si-color. Ill Tech.

Shows and compares four methods of solving marble bottling problems with mechanical devices as time savers.

Western Electric-Iowa Skill Study. (28 min) 16si. U of Ia.¹

¹University of Iowa Time and Motion Studies by the Industrial Engineering Laboratory.

²Percentage figures in parentheses indicate the increase in output resulting from application of principles of motion economy.

Machine Shop

ABRASIVES AND GRINDING

MOTION PICTURES

Cutter Sharpening. (14 min) 16sd. Norton.

Demonstrates typical tool and cutter grinding machine, with close up showing operations of grinding commonly used tools.

Cylindrical Grinder. (20 min) 16sd. Norton.

Points out operating levers, hand wheels, push buttons that control the movement of wheel, head, table, work of cylindrical grinding machine.

Endfeed Grinding a Taper Pin. (26 min) 16sd-\$32.53. USOE-Castle. OE89.

Shows the principle of endfeed grinding; how to use cams in tapering the regulating wheel and grinding wheel; how to rough-and-finish endfeed grind; how to use a taper collet gage and Prussian blue to check work; how to redress the wheels for the finish grind; how to use the light gage; how to correct taper error of less than .0005.

First Principles in Grinding. 16sd. Carborundum.

To demonstrate grinding principles to trainees.

Grinding a Deep Hole. (18 min) 16sd-\$25.22. USOE-Castle. OE78.

Shows how to grind the backing pins and work-holding jaws of a three-jaw chuck to hold the workpiece; how to select the spindle projection and the grinding wheel; how to set length of stroke and break-through; how to correct for taper and bellmouth; and how to check a deep hole with an inside micrometer.

Grinding a Parallel Bar—Part I: Setting Up the Machine. (14 min) 16sd-\$21.95. USOE-Castle. OE220.

Shows how to mount a grinding wheel; how to position the diamond tool and true the wheel;

how to operate a magnetic chuck; how to use the controls of the grinder; how to grind the face of the chuck. [*Part II shows grinding operations.*]

Grinding a Plain Pin—Part I: Grinding Wheel. (17 min) 16sd-\$24.60. USOE-Castle. OE80.

Shows the cutting action of a grinding wheel; how to select the correct grinding wheel; how to handle and mount the wheel on the collet; how to true and balance the wheel.

Grinding a Plain Pin—Part II: Grinding Operations. (17 min) 16sd-\$23.98. USOE-Castle. OE81.

Shows how to lubricate and set up a center-type grinder; how to prepare the workpiece for grinding; how to mount and adjust the workpiece for proper tension between centers; how to set the table reversing dogs; how to rough-grind a plain pin.

Grinding a Slender Shaft With Back Rest. (17 min) 16sd-\$23.98. USOE-Castle. OE82.

Shows how to prepare the machine for the job; how to select and set up a back rest; how to adjust the back rest during grinding; how to rough and finish-grind the long shaft; how to adjust and check for taper.

Grinding a Straight Hole. (18 min) 16sd-\$25.22. USOE-Castle. OE77.

Shows how to use a universal chuck; how to true up the work with a dial indicator, how to select the proper grinding wheel and adjust the wheel speed; how to set the length of stroke; how to set the cross-feed for automatic grinding; and how to use the precision cross-feed for finish grinding.

Grinding a Taper. (19 min) 16sd-\$26.47. USOE-Castle. OE84.

Shows how to prepare an arbor for grinding; how to mount and adjust the arbor between center; how to adjust the swivel table and taper scale; how to rough and finish-grind the taper; how to check the taper ring gage and the light gage.

Grinding a Template. (15 min) 16sd-\$22.58.
USOE-Castle. OE222.

Shows how to mount and true the wheel; how to mount the sine bar on the table; how to set the sine bar for specified angles; how to set up the template on the sine bar; how to rough and finish-grind the template; how to check the workpiece for accuracy.

Grinding a V-Block. (22 min) 16sd-\$29.02.
USOE-Castle. OE223.

Shows how to set up a V-block to grind the ends and the V; how to rough and finish-grind the ends; how to establish reference points for grinding the V to precision dimensions; how to check the work for accuracy.

Grinding & Facing a Blind Hole. (17 min)
16sd-\$23.98. USOE-Castle. OE79.

Shows how to mount and dress the wheels on the two-spindle grinder; how to prepare the diaphragm chuck; how to plunge-grind the bore and adjust for taper; how to grind the shoulder and flange parallel at right angles to the bore.

Grinding Multiple-Point Carbide Tools. (20 min) 16sd-\$27.74. USOE-Castle. OE243.

Shows how to remove, grind, reassemble, and align blades from inserted-blade type cutter. Demonstrates circle-grinding, surface-grinding of tooth relief angles, honing, and inspecting re-sharpened cutters.

Grinding Practices. (10 min) 16sd-rental loan.
McFarland or U of Ill.

Presents theory of grinding rates, feeds, and abrasives in the grinding of special jobs such as forming and threading.

Grinding Single-Point Carbide Tools. (26 min) 16sd-\$34.01. USOE-Castle. OE242.

Demonstrates preparing the wheel for grinding, semifinish and finish-grinding a dull tool, grinding a broken or chipped tip, grinding a newly brazed tool, and grinding a chip breaker.

Grinding Thin Discs. (15 min) 16sd-\$23.22.
USOE-Castle. OE224.

Shows how to true the grinding wheel; how to load and operate the magnetic chuck; how to rough-grind the discs; how to finish-grind the discs to precision measurements; how to check them for accuracy and parallelism.

Grinding Wheel—Its Care & Use. (17 min)
16sd. Norton.

Shows mounting; balancing a new wheel, truing it for desired finish; cause of surface imperfections; checking wheel speeds; care in storing and handling.

Infeed Grinding a Shaft of Two Diameters. (31 min) 16sd-\$37.88. USOE-Castle. OE88.

Shows how to profile grind shafts by the infeed method; how to use cams in profiling the regulating wheel and grinding wheel; how to install the cams; how to profile the wheels; how to set up the centerless grinding machine for the job; how to rough and finish-profile grind.

Infeed Grinding Shouldered Work. (23 min)
16sd-\$30.05. USOE-Castle. OE87.

Shows the basic principle of infeed grinding; the use of an automatic ejector; how to tilt the regulating wheel for this type of grinding; the use of the infeed lever; how to adjust the end-stop; how to position the work for grinding; how to correct work ground out of round; how to check work with V block, indicator and micrometer.

Manufactured Abrasives. (24 min) 1940.
16sd. (24 min) 1940. 16si. Carborundum in cooperation with USBM.

Shows experiment that led to discovery of carborundum and shows use of power generated from Niagara Falls in the manufacture of abrasive products. Depicts making of carborundum, making of grinding wheels by the vitrified process. Illustrates uses of manufactured abrasives.

Manufacture of Coated Abrasives. (45 min)
16si-color. Behr Manning Corp. of Norton.

The story of the manufacture of abrasive papers and wheels.

Norton Abrasives in Tool Grinding. (10 min)
16sd-color. Norton.

Shows operations performed in the tool room with important machines. Shows setting up for grinding an end mill on a cutter and tool grinding machine.

Plunge Cut Grinding. (15 min) 16sd-\$22.11.
USOE-Castle. OE83.

Shows how to mount a bushing on a mandrel; how to dress the side of the grinding wheel; how to set a dial snap gage for the production grinding of bushings; how to rough and finish-grind a bushing; the importance of rhythm in production grinding.

Progressive Honing, With Automatic Sizing. (18 min) 16sd-free loan. Micromatic.

Produced to illustrate lessons learned during war production programs that can be applied to peacetime industrial production. Designed to aid manufacturer with machine tool problems—problems of finishing metals. Shows development in the honing (surface processing of metals) during wartime, the construction and operation of the new tool, operation of the microsize and hydrosize control, and explaining multiple and progressive honing, and the adaptation of the honing process to mass production methods.

Romance of Industry, A (Abrasives). (45 min) 16si. YMCA. Carborundum.

Shows usage of abrasives, and manufacture of abrasives and abrasive products.

Sharpening a Form Relieved Cutter. (18 min) 16sd-\$25.22. USOE-Castle. OE93.

Shows what constitutes the rake angle and the clearance angle of the form relieved cutter; how to mount correct attachment; how to set up for spotting back of teeth; how to grind face of teeth.

Sharpening a Plain Helical Cutter. (16 min)
16sd-\$23.35. USOE-Castle. OE91.

Shows how to mount the helical cutter on an arbor; how to arrange the four elements in the same horizontal plane; how to grind the secondary clearance angle; how to check and adjust for taper when grinding the primary clearance angle.

Sharpening a Shell End Mill. (17 min) 16sd-\$23.98. USOE-Castle. OE92.

Shows how to select the correct arbor; how to mount the work head; how to adjust the work head for clearance settings; how to set up for sharpening the outside diameter, the corner, and the face.

Sharpening a Side Milling Cutter. (23 min)
16sd-\$30.79. USOE-Castle. OE90.

Shows how to identify the parts of a cutter; how to select and mount the correct grinding wheel; how to mount the cutter; how to set up the grinder for sharpening; how to set the correct clearance angle; how to check for correct width of land.

Sharpening an Angular Cutter. (15 min) 16sd-\$22.11. USOE-Castle. OE91.

Shows how to choose the correct grinding wheel; how to adjust the swivel table for grinding the angular teeth of the cutter; how to adjust for clearance angle when grinding with the periphery of the wheel; how to check the teeth for accuracy of the angle.

Surface Grinder, The. (17 min) 16sd. Norton.

Surface grinders employed for different types of work are shown with the finishes they produce.

Thrufeed Grinding a Straight Pin—Part I. (29 min) 16sd-\$35.61. USOE-Castle. OE85.

Shows the principle of centerless grinding; the basic elements of the centerless grinding machine; the basic principle of thrufeed grinding; how to set up the machine for an actual job (limited to mounting wheel, workrest, workblade, workguides, diamonds); how to true the grinding and regulating wheels.

Thrufeed Grinding a Straight Pin—Part II. (28 min) 16sd-\$35.02. USOE-Castle. OE86.

Shows how to balance the grinding wheel; how to position the work for grinding; how to adjust the work guides; how to take the trial grind; how to eliminate taper in the workpiece; how to use a crown cam to dress the grinding wheel; how to check the workpieces.

S L I D E F I L M S

Abrasive Wheels. (sd slide) Abrasive.

Shows what grinding wheels are made of, how they are made and what they are used for.

Grinding & Sharpening. (17 frames) Jam Handy.

Methods of sharpening tools on electric grinders; safety precautions; sharpening twist drills; checking drill angles with drill gauge.

Grinding Machines. (42 pictures-40 frames) Jam Handy.

Grinders and grinding wheels; what can be done with them; types of abrasives and wheels.

BENCH & HAND WORK MOTION PICTURES

Centering Small Stock. (12 min) 16sd-\$17.97. USOE-Castle. OE39.

Shows how to locate the center of round, square and rectangular pieces, using (1) surface plate, V-blocks and surface gage; (2) hermaphrodite calipers; and (3) a center head and rule.

Cutting Threads With Taps and Dies. (19 min) 16sd-\$26.47. USOE-Castle. OE31.

Shows the methods, operations, and procedures for cutting small threads with hand taps and dies. Explains the correct use of the taper tap; the plug tap; and the bottoming tap in cutting internal threads in a blind hole; how to use a hand die to cut threads on a stud to fit in the tapped holes.

Fitting & Scraping Small Bearings. (21 min) 16sd-\$27.09. USOE-Castle. OE36.

Shows the scraping of split and solid bearings; the laying out and chipping of oil grooves; and the fitting of the shaft to the bearings. Shows forms of hand scrapers used for scraping curved surfaces and explains why bearing must be relieved to aid lubrication.



Fundamentals of Filing (see below).

Fundamentals of Filing. (12 min) 16sd-\$18.59. USOE-Castle. OE41.

Shows the various kind of files and indicates the general type of work that each is used for. Shows the use of single cut files; draw filing with a single cut fine file; the difference between the single cut and double cut files. Explains the types of files which are used for different types of jobs and with different metals.

Hacksaws. (18 min) 1943. 16sd-\$18. Plomb.

How to select proper blades for various metals and shows correct methods of use.

How to Drill. (14 min) 16sd. Douglas.

Shows the electric hand drill, its operation, its importance, the drill motor, and drilling practices with safety precautions. Also shows extension drill and snake drill.

Laying Out Small Castings. (16 min) 16sd-\$23.35. USOE-Castle. OE40.

Shows the methods and procedures used when laying out holes for drilling; how to locate a reference point; the use of the hermaphrodite calipers, the combination square, and the surface gage.

Pliers & Screwdriver. (17 min) 1943. 16sd-\$13.07. Plomb.

How to correctly use these tools; what not to do with them.

Punches, Drifts, & Bars. (14 min) 1943. 16sd. Plomb.

Shows correct handling of types and the sizes for particular jobs.

Reaming With Straight Hand Reamers. (20 min) 16sd-\$27.09. USOE-Castle. OE37.

Shows how to drill and machine-ream two holes in line and how to finish the hole to size, using a straight fluted reamer. Shows the reamer, names its parts, describes cutting angles, and explains its cutting action. Shows how to use a helical-fluted reamer in reaming a hole in a gear blank having a keyway.

Reaming With Taper Hand Reamers. (15 min) 16sd-\$22.73. USOE-Castle. OE38.

Demonstrates the hand reaming of a taper pin hole through a shaft and collar. Shows the taper reaming of a dowel pin hole in a split bearing to maintain alignment between the bearing cap and the bearing base, and the action of a reamer in removing metal.

Save Those Tools. (10 min) 16sd. Int'l Harvester.

Features the repairing of broken or damaged tools by the low-temperature method. Shows how to salvage obsolete and excess tools.

Scraping Flat Surfaces. (14 min) 16sd-\$21.49.
USOE-Castle. OE35.

Shows the operations and procedures used in hand scraping flat surfaces to a surface plate; five common forms of hand scrapers and the operations and care of the flat scraper in detail. Emphasizes methods used in scraping around holes and near edges of flat surface.

Shrinking & Stretching of Angles. (20 min) 1942. 16sd-\$32. Sd Masters.

Illustrates and explains the V-block and the shrinking block; shrinking and stretching techniques using both hammers and pliers.

Use & Care of Hand Files. (11 min) 1942. 16sd-\$66. Jam Handy.

Shows types of files, identifies various parts of files; shows correct movements and positions; uses of files, cleaning and caring for files.

Wrenches. (20 min) 1943. 16sd-\$17.76. Plomb.

Shows use of flat and socket wrenches and their attachments.

S L I D E F I L M S

Files & How to Use Them. (68 frames) sd. DeFrenes.

Practical instructions from the work bench on the selection, use and care of files.

Hand Tools. (100 pictures-78 frames) Jam Handy.

Description of hand tools, their care and use.

Rules for Tools. (97 frames) sd. Nat'l Safety.

Small hand tools as characters tell about their misuse, and recommend careful handling.

BORING MILL, HORIZONTAL

MOTION PICTURES

Drilling, Tapping, Stub Boring, & Reaming. (22 min) 16sd-\$29.67. USOE-Castle. OE230.

Shows how to drill and machine-tap a hole; how to use a core drill; how to use a stub-boring bar for rough- and finish-boring and counterboring; how to use an adjustable reamer; how to use a floating reamer.

Face Milling With a Fixture. (15 min) 16sd-\$23.87. USOE-Castle. OE226.

Shows how to determine speed and feed; how to establish reference surfaces; how to make reference cut by end milling a flange; how to make reference cut by milling the face.

Contour Face Milling. (17 min) 16sd-\$25.17. USOE-Castle. OE227.

Shows how to set up the job; how to align workpiece square with spindle; how to make a rough facing cut; how to make a finish facing cut.

Rough Line-Boring. (19 min) 16sd-\$27.10. USOE-Castle. OE229.

Shows how to install the boring bar and cutters; how to bore, counterbore, and spot-face holes; how to reposition from one hole to another.

Set Up for Face Milling With a Fixture. (20 min) 16sd-\$27.74. USOE-Castle. OE225.

Shows how the horizontal boring, drilling, and milling machine operates; how to install the fixture; how to set up the workpiece; how to select and install an end mill and a face mill.

Setup For Rough Line-Boring. (15 min) 16sd-\$23.22. USOE-Castle. OE228.

Shows how to plan operations to be done, using the work drawing; how to position the workpiece on the table; how to position the spindle for horizontal centers; how to position the spindle for vertical centers.

BORING MILL, VERTICAL

MOTION PICTURES

Facing, Turning, Boring, Grooving, & Chamfering. (31 min) 16sd-\$38.52. USOE-Castle. OE18.

Shows the operations and procedures followed when tooling up a vertical turret lathe for operations requiring the simultaneous use of both vertical and side heads. An indicator is used to check the setting of the fixture and for mounting the work centrally on the fixture.

Rough Facing & Boring, & Turning a Shoulder on Vertical Turret Lathe. (22 min) 16sd-\$28.95. USOE-Castle. OE17.

A rough aluminum casting, held on the table by means of clamps and U-bolts is centered and leveled with the use of a dummy indicator. It is rough-machined with tools mounted in the main turret head and side head. The horizontal and vertical movements of cutting tools, and the levers that control these movements are demonstrated.

Rough Facing, Turning & Drilling. (31 min) 16sd-\$38.52. USOE-Castle. OE16.

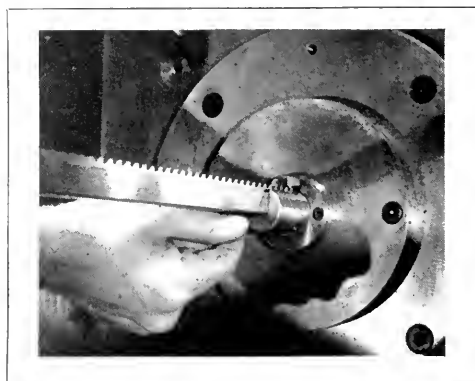
Shows how to center and chuck an aluminum airplane engine casting on the table of the vertical turret lathe, and how to tool up the vertical head and side head for the machining operations. Detailed instructions are given for indexing the main head, and for using all the controls on the machine. A typical operation sheet guides the work of the operator.

BROACHING

MOTION PICTURES

Broaching an Internal Keyway. (23 min) 16sd-\$30.79. USOE-Castle. OE236.

Explains what internal broaching is. Shows how the broaching tool cuts; the principles of broaching tool design; how to select the broaching tool for the job; how to set up the machine for the job; how to operate the horizontal broaching machine.



Broaching an Internal Keyway (see above).

Double Ram Vertical Surface Broaching. (30 min) 16sd-\$37.24. USOE-Castle. OE238.

Shows how to assemble broaching inserts in right- and left-hand toolholders; how to mount and adjust tool holders in the double ram; how to mount and adjust the work fixtures; how to set trip dogs for the ram stroke; how to measure the workpiece after trial broaching; how to surface-broach on a double ram vertical broaching machine at a production rate.

Single Ram Vertical Surface Broaching. (28 min) 16sd-\$35.95. USOE-Castle. OE237.

Shows the parts of a single ram vertical machine; how to interpret the blueprint of a broaching tool; how to install broaching inserts for straddle broaching; how to mount the toolholder with its assembled broaching tool; how to mount and adjust the work fixture; how to surface-broach at production rate.

CUTTING TOOLS

MOTION PICTURES

Cutting With Carbide Tools—Part I: Single Point. (19 min) 16sd-\$27.10. USOE-Castle. OE244.

Shows how to select the tool and set up the job; and how to calculate speed, feed, and depth of cut, using a single-point carbide tool.

Cutting With Carbide Tools—Part II: Milling Cutters. (15 min) 16sd-\$23.22. USOE-Castle. OE245.

Demonstrates selecting a cutter; determining feed, speed, and depth of cut; setting up workpiece and positioning the cutter; face-milling a workpiece; and reducing power consumed.

Metal Cutting Principles & Practices. (22 min) 16sd. FiPr.

Shows the structures of metal and the production of chips. Theory and effects of clearance, angles, tools, speeds, feeds, and cutting fluids are discussed and analyzed.

Physics of Metal Cutting. (30 min) 16si. Cin Mill.

Picture prepared in conjunction with a lecture of Hans Ernst on the theory involved in metal cutting. Based chiefly on moving photo-micrographs and photo-elastic stress pictures. Chip formation fluid advantages are illustrated and studied.

DRILL PRESS

MOTION PICTURES

Basic Machines—The Drill Press. (10 min) 16sd-\$17.07. USOE-Castle. OE71.

Principal parts of the drill press; how to operate a simple drill press; other types of drill presses and their uses.

Countersinking, Counterboring & Spot Facing. (20 min) 16sd-\$27.09. USOE-Castle. OE48.

The methods and sequences followed when setting up a vertical drill for different production jobs. The first piece is 3/16th by 2 inch steel which must be drilled and countersunk. The second piece is a small cast-iron pedestal, the hub of which must be drilled and counterbored and the base drilled and spotfaced.

Drilling a Hole in a Pin. (10 min) 16sd-\$16.73. USOE-Castle. OE46.

The operations and sequences followed when drilling a hole in each end of a steel pin. Two methods are shown: drilling to a layout; and

drilling with a jig. The use of a jig when drilling small deep holes is shown. Commentary is used to emphasize the various safety precautions that must be observed.

Drilling & Tapping a Cast Steel Valve Body. (19 min) 16sd-\$25.85. USOE-Castle. OE22.

Shows the technique used when drilling and tapping blind holes in cast steel on a radial drill. Setting up the work, setting the jig, and clamping the work in place on the table are shown. Calculating the size of the tap drill and the method used when setting the machine to drill a number of holes to the same depth is demonstrated.

Drilling to a Layout & Spotfacing a Cast Iron Valve Body. (15 min) 16sd-\$22.73. USOE-Castle. OE23.

The technique used when drilling to a layout and spot facing the under side of a flange. The drill is started and test spot is drilled. It is badly off center, and the technique used in drawing it over to the center of the layout is demonstrated. The reasons why the drill often starts off center and the basic reasons underlying the various techniques used in drawing it back on center are demonstrated.

Locating Holes, Drilling & Tapping in Cast Iron. (18 min) 16sd-\$25.22. USOE-Castle. OE47.

The methods and sequences followed when drilling and tapping cast iron. Method of locating the center of the bolt circle and the centers of the various bolt holes are shown. A tapping chuck of standard make is used to tap the two holes for set screws. The method of setting the machine for this operation and precautions operator must take are shown in detail.

Uses & Abuses of Twist Drills. (30 min) 16sd. Cleveland.

Shows the fundamental principles which are combined to produce the twist drill and the proper and improper methods of handling and using them.

SLIDE FILMS

Drills & Drilling. (87 frames) Jam Handy.

Types of drilling. Parts of a drill; drilling machines; techniques.

Drill Presses—Part I. (47 frames) Jam Handy.

Types of drill presses; when and where used; hold the drill in press.

Drill Presses—Part II. (43 frames) Jam Handy.

Holding the work in the press; the seven major operations.

Reaming, Tapping, & Threading. (70 pictures-80 frames) Jam Handy.

Types of reamers, taps and dies; techniques; removing broken taps.

GEAR HOBBING

MOTION PICTURES

Cutting Teeth on a Worm Gear. (17 min) 16sd-\$25.17. USOE-Castle. OE211.

Shows the mounting of workpiece between centers; swiveling table to correct angle; setting dividing head for specified indexing; positioning workpiece for gashing; gashing the teeth on the workpiece; mounting the hob and workpiece for hobbing operations; positioning workpiece under dead center of hob; meshing gashed gear with hob and hobbing the teeth.

Hobbing a Helical Gear, Two Cuts Nondifferential Method. (17 min) 16sd-\$24.60. USOE-Castle. OE235.

Shows how to set up the change gears; how to adjust the swivel head to cut on the helix angle; how to set up the machine for the rough cut; how to realign hob and gear teeth after disturbing the lead.

Hobbing a Spur Gear—Part I: Setting up the Change Gears. (15 min) 16sd-\$22.73. USOE-Castle. OE231.

Shows the factors governing the selection of the hob; how to select change-gear combinations for speed, feed, and index; how to identify the correct gears; how to mount the change gears; how to adjust for backlash; how change gear trains are interrelated.

Hobbing a Spur Gear—Part II: Setting Up & Hobbing Work. (24 min) 16sd-\$31.29. USOE-Castle. OE232.

Shows how to select and mount the hob; how to set the swivel head angle; how to choose and mount the fixture; how to lead the gear blanks; how to set up for depth of trial cut; how to adjust for full depth of cut.

Hobbing a Square Tooth Spline Shaft. (17 min) 16sd-\$23.98. USOE-Castle. OE233.

Shows how to change hob arbors; how to centralize the hob with centering gage; how to mount the center-type fixture and the top adjustable center; how to use a driving dog in mounting the spline shaft blank; how to set up for trial cut; how to take full depth of cut.

Hobbing a Worm Gear. Infeed Method. (18 min) 16sd-\$25.22. USOE-Castle. OE234.

Shows the angle at which to set the swivel head; how to calculate and adjust the height of the hob arbor; how to engage horizontal feed; how to centralize the hob; how to cut to a center distance.

LATHES

MOTION PICTURES

Bar Work—Magnesium. Part I: Setting Up Bar Mechanism & Roller Turner. (18 min) 16sd-\$25.81. USOE-Castle. OE216.

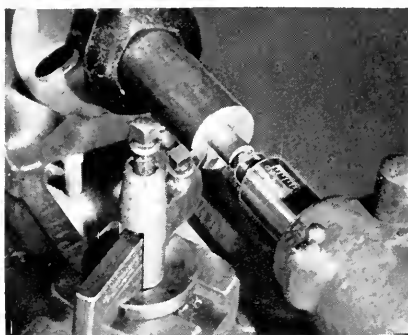
Shows planning the setup sequence; various steps in setting up bar feed mechanism; how to make a rough sizing cut for the roller turner; how to set rolls in the roller turner; how to set the tool in the roller turner for a finish size; how to set the automatic stops; how to control the chip condition when using a roller turner to insure good finish.

Bar Work—Magnesium. Part II: Setting Up Multiple Roller Turner & Turning a Taper. (17 min) 16sd-\$25.17. USOE-Castle. OE217.

Shows how to set up a multiple roller turner; how to roll lead the tools on the second roller back-rest turner to insure concentric diameters; how to center-drill the work so that it can be supported with a center; how to set up and operate carriage taper attachment.

Bar Work—Magnesium. Part III: Necking & Threading by Use of Attachment & Die Head. (23 min) 1945. 16sd-\$30.79. USOE-Castle. OE218.

Shows how to set the necking and chamfering tools; how to set and use the carriage threading attachment; how to set and cut $3\frac{1}{4}$ " 10-pitch thread with tangent die head; how to cut off the finished piece.



Basic Machines—The Lathe (see below).

Basic Machines—The Lathe. (15 min) 16sd-\$23.22. USOE-Castle. OE68.

How the lathe removes metal; how the work is supported in the lathe; how power is applied to rotate it; how spindle speeds are changed; how the cutting tool is supported and moved. How the rate of feed is changed.

Boring to Close Tolerances. (17 min) 16sd-\$24.60. USOE-Castle. OE59.

Shows how to mount and adjust the brass valve bonnet in a ring fixture; how to select and set boring tools for brass; how to rough and finish-face the hub; how to rough and finish-bore the hole to close tolerances; how to prevent bellmouth when boring a hole; how to use a plug gage; how to set inside calipers for close measurement.

Chips. (29 min) 1942. 16sd. Warner.

Depicts the general technique and fine points of grinding cutters for use in turret lathes.

Chuck Work—Part I: Setting Up the Hex Turret Tools. (22 min) 1945. 16sd-\$29.67. USOE-Castle. OE213.

Shows how to plan the job; how to use a power chuck; how to set up tools for internal cuts; how to set up tools for multiple cuts; how to set up feed stops for the hexagon turret.

Chuck Work—Part II: Setting Up Tools for Combined Cuts. (16 min) 1945. 16sd-\$23.87. USOE-Castle. OE214.

Shows how to set up tools for the square turret; how to make combined cuts; how to set cross-slide and carriage stops; how to set up the speed pre-selector; how to perform a sequence of operations efficiently.

Cutting a Taper With the Compound Rest & With a Taper Attachment. (11 min) 16sd-\$17.35. USOE-Castle. OE8.

Animation and demonstration on the lathe show the correct method of setting the compound to cut a steep taper, and how to set the taper attachment for cutting a taper of $1\frac{1}{2}$ " per foot. Full instructions are given for setting the tool when cutting a taper; the correct use of roughing and finishing tools; and the use of the bevel protractor and ring gage to measure tapers.

Cutting an External Acme Thread. (16 min) 16sd-\$23.35. USOE-Castle. OE45.

Shows the work being mounted on a mandrel, and placed between centers on the lathe. Shows how to set the lathe gears for cutting a thread. The selection, checking, and setting up of roughing and finishing tools are included. Sequences show how to cut the thread with and without using the threading dial.

Cutting an External National Fine Thread. (12 min) 16sd-\$18.59. USOE-Castle. OE10.

Describes the various shapes of threads and their uses; gives the characteristics of the National Fine Thread; shows the procedure used to cut such a thread on a lathe. Detailed instructions are given for checking the shape of the threading tool with a gage, the proper setting of the tool for cutting a thread; and how to set the lathe for cutting the required pitch. Use of the threading dial is shown in detail.

Cutting an Internal Acme Thread. (22 min) 16sd-\$28.95. USOE-Castle. OE56.

Shows how to set up the lathe and cut an internal right hand acme thread; how to grind and check the stocking and forming tools; why the compound rest is set at an angle toward the headstock when cutting a right-hand internal thread; how the finish forming tool is centered in the groove formed by the stocking tool; how to set the threading tools to the work; and how to gage the finished threads.

Cutting an Internal Taper Pipe Thread. (20 min) 16sd-\$27.09. USOE-Castle. OE57.

Shows how to use a taper attachment when cutting internal pipe threads; how to bore a tapered hole to gage size for threading; how to thread a tapered hole to fit a gage; how to compute pipe thread dimensions.

Drilling, Boring & Reaming Work Held in Chuck. (11 min) 16sd-\$17.35. USOE-Castle. OE9.

Shows the operations for cutting a tapered hole in a forged steel gear blank, using the taper attachment. The operations of centering the piece in a chuck, rough-facing, drilling, taper-boring, and reaming are given in detail. A taper plug gage is used to check the size and taper of the finished hole.

Elementary Operations on the Engine Lathe. (22 min) 1941. 16sd. EBFilms.

Demonstrates modern shop practices; close-up, isolate and enlarge critical procedures. Correct alignment of lathe showing details in facing, straight turning, squaring a shoulder; working accurately to dimensions from a mechanical drawing; use of micrometers in connection with graduated dials.

How to Run a Lathe. (60 min) 16sd-color. S Bend Lathe.

Shows metal working lathe; technique of turning work between centers; covers blueprints, measuring, centering, rough turning, finishing.

Lathe Operation. (20 min) 16sd. U of Ill. Visual Aids Services.

Shows operation of lathe in turning, grinding, cutting, boring, tapering and facing operations. Demonstrates principles of lathe, parts, accessories.

Machining Work Held in Chuck—Use of Reference Surfaces. (24 min) 16sd-\$30.67. USOE-Castle. OE60.

Shows how to select and machine surfaces to be used for reference; how to set up a workpiece accurately to the reference surfaces in a lathe chuck; and how to use a boring bar to machine several internal surfaces.

Metal Working Lathe, The. (20 min) 1941. 16sd-color; B & W-\$42.50. Also loan. S Bend Lathe.

Shows lathe, its uses, its operation and demonstrates turning, facing and thread cutting.

Plain Turning. (20 min) 1941. 16sd-color-\$110; B & W-\$45. Also loan. S Bend Lathe.

Companion film to *Metal Working Lathe* (listed at left); demonstrates operations in machining a shaft held between lathe centers. Basic procedures in lathe work; blueprint reading; measuring with calipers, micrometers; locating and drilling center holes; selection of tools for cutting, rough turning and finish turning of workpiece.

Precision at Work. (45 min) 16si. Monarch Machine.

Operation of the precision lathe, its construction. Shows accuracy necessary to make lathe the precision machine that it is.

Rough Turning Between Centers. (15 min) 16sd-\$22.73. USOE-Castle. OE6.

Shows how to set up an engine lathe for machining work held between head and tail centers. Emphasizes safety precautions in dress and work, the necessity for constant reference to the blueprint, the lubrication of the machine, care of the centers, and the proper use of the various lathe controls.

Setting Up & Machining Bar Stock. (34 min) 1945. 16sd-\$41.45. USOE-Castle. OE215.

Shows how to set up the turret tool; how to adjust the stops; how to install the collet and how to set up the stock; setting up the hexagon turret; setting up the cross slide; and how to operate the machine.

Turning a Taper With the Tailstock Set Over. (17 min) 16sd-\$24.60. USOE-Castle. OE44.

Shows three methods used to measure the tailstock set-over when turning tapers. Methods of calculating the amount the tailstock must be set over to cut a given taper are shown.

Turning Work Held on a Fixture. (21 min) 16sd-\$27.71. USOE-Castle. OE58.

Shows how to mount on a special fixture for machining an irregularly shaped casting which cannot be held in chuck; how to mount and center the fixture on the lathe; how to grind tools for the machining of brass.

Turning Work Held on a Mandrel. (20 min) 16sd-\$27.09. USOE-Castle. OE61.

Shows what a mandrel is, and on what type of job it can be used to advantage; how to fit the mandrel into the workpiece; how to mount the mandrel and work between centers; how to protect the mandrel from injury by cutting tools; how to cut a bevel, using the compound rest; and how to calculate speed and feed, and set the controls.

Turning Work of Two Diameters. (14 min) 16sd-\$21.49. USOE-Castle. OE7.

Shows the sequence of operations followed when turning a gear blank with its shaft from a solid piece of round stock. Each shaft is rough turned and finished turned to size before the piece is reversed between centers. The sides of the gear blank are finished after the piece has been turned to size.

Turret Lathe, The—An Introduction. (17 min) 16sd-\$25.17. USOE-Castle. OE212.

Shows how functions of the head, hexagon turret, square turret, and bed are used; how to determine the sequence of operations; how to take a multiple cut; how to combine cuts from the hexagon and square turrets.

Turret Lathes. (45 min) 16sd-color. Gisholt—Modern.

Shows operations which can be performed on turret lathe, the method of setting up machine for different types of cuts.

Using a Boring Bar Between Centers. (22 min) 16sd-\$28.33. USOE-Castle. OE64.

Shows how to set up a boring bar between centers of a lathe; how to clamp an irregular workpiece on a lathe carriage; and how to align the workpiece center with the lathe centerline.

Using a Follower Rest. (21 min) 16sd-\$27.71. USOE-Castle. OE63.

Shows what the follower rest is, and when to use it; how the follower rest supports the work against the pressure of the cutting tool; how to mount the follower rest on the lathe; how to adjust the jaws of the follower rest to the work; how to lubricate the work to prevent damage to the jaws and workpiece.

Using a Steady Rest. (25 min) 16sd-\$31.91. USOE-Castle. OE62.

Shows what the steady rest is, and when to use it; how the steady rest supports the work against the pressure of the cutting tool; how to spot the work for the location of the steady rest; how to mount rest on the lathe; how to adjust the jaws of the rest of the work.

Using a Steady Rest When Boring. (21 min) 16sd-\$27.71. USOE-Castle. OE65.

Shows how to mount a long casting on a lathe face plate; how to turn a true bearing spot for supporting the workpiece with steady rest; how to position and adjust steady rest; how boring, turning, forming operations are performed when work is supported by steady rest.

S L I D E F I L M S

Internally Threading a Plate—Making a Stud—Extracting a Broken Stud. (46 pictures-44 frames) Jam Handy.

Drilling holes for tapped thread; proper use of complete tap set; cutting external threads; removal of broken studs.

Lathes—Part I. (59 pictures-59 frames) Jam Handy.

The lathe and its construction; parts and functions; holding work in lathe.

Lathes—Part II. (47 pictures-46 frames) Jam Handy.

Operations performed on the lathe; care of lathes and safety hints.

Machine Tools: The Lathe. AAF-Castle. FS1-4.

Gives nomenclature; practical uses and operation of the lathe.

Specialized Machines (Turret Lathes). (35 pictures-31 frames) Jam Handy.

What the turret lathe is and what can be done with it; the automatic screw machine and its functions; relationship to lathe work.

METAL CUTTING BAND SAW

MOTION PICTURES

Filing an Internal Irregular Shape. (27 min) 16sd-\$33.78. USOE-Castle. OE240.

Shows how to make file selection; how to set up a metal cutting band saw machine for filing;

how to file a die; how to lay out a punch using a die as a template; how to file a punch; how to check the filing of a punch with a die; how to fine finish file.

Sawing an Internal Irregular Shape. (32 min) 16sd-\$39.16. USOE-Castle. OE239.

Shows how to drill the saw starting hole; how to make the saw selection; how to set up a band saw machine; how to weld saw bands; how to saw an internal contour shape; how to remove and store a band saw.

S L I D E F I L M S

Hand & Power Hack Saws. (69 pictures-60 frames) Jam Handy.

Sawing various metals; selection of speeds and feeds.

MILLING MACHINES

MOTION PICTURES

Basic Machines—The Milling Machine. (15 min) 16sd-\$23.22. USOE-Castle. OE69.

How the milling machine removes metal; how the cutter is held; how power is applied to rotate it; how spindle speeds are changed; how the work is supported and fed to the cutter; how the rate of feed is changed.

Boring Holes With Offset Boring Head. (28 min) 16sd-\$35.30. USOE-Castle. OE209.

Shows how to mount the workpiece on the milling machine table; how to use a wiggler to position the workpiece for drilling; how to mount the cutting tools in the spindle; how to bore with an offset boring head; how to position the table to bore a second hole at an exact distance from a previously drilled hole; how to use plug gages and micrometer to check the center distance between the holes.

Cutting a Dovetail Taper Slide. (26 min) 16sd-\$33.15. USOE-Castle. OE73.

Shows how to machine a dovetail taper slide on the vertical milling machine; how to use a rotary table in milling a taper; and how to mill to layout lines.

Cutting A Round End Keyway. (22 min) 16sd-\$28.33. USOE-Castle. OE74.

Shows how to cut a round end keyway in a steel shaft; how to align the spindle and workpiece by using a test bar; how to use a two-lip end mill to sink a hole in solid stock; how to set trip dogs and table stops; and how to check the finished dimensions of a round end keyway.

Cutting a Short Rack. (18 min) 16sd-\$25.81. USOE-Castle. OE208.

Shows how to set up the machine; how to set up and align workpiece on milling machine table; how to position table and workpiece in relation to the cutter; how to rough and finish-mill the workpiece.

Cutting Keyways (15 min) 16sd-\$22.11. USOE-Castle. OE12.

Shows how to set up a shaft on the table of the milling machine for cutting a keyway at each end. The selection of the proper cutter; the determination of the correct speed and feed; and the setting of the machine for the proper depth of cut and length of cut are illustrated. Demonstrates the use of micrometer collars on lead screws.

Milling a Circular T-Slot. (22 min) 16sd-\$28.33. USOE-Castle. OE76.

Shows how to mill a circular T-slot in solid metal; how to use a rotary table for continuous circular milling; how to use a two-lip end mill, an end mill, and T-slot cutter; how to use a dial indicator with a test bar in aligning the table.

Milling a Helical Cutter. (18 min) 1945. 16sd-\$25.81. USOE-Castle. OE210.

Shows assembling and installing correct gears in gear box; mounting arbor, cutter, and arbor support; aligning dividing head and tailstock centers and offsetting for correct operating position; mounting workpiece between centers; setting dividing head for specified number of divisions; swiveling table to specified angle; positioning workpiece for first cut; rough and finish-milling the workpiece.

Milling a Helical Groove. (28 min) 16sd-\$35.02. USOE-Castle. OE75.

Shows how to mill a helical groove in cylindrical shaft on the vertical milling machine; defines and explains lead; shows how to select and set the machine gears for milling a helical groove with any lead; explains backlash; shows how to use the dividing head.

Milling a Template. (17 min) 1945. 16sd-\$25.17. USOE-Castle. OE207.

Shows how to mount the end mill in the milling machine spindle; how to set up and align the template on the milling machine table; how to position the table and workpiece in relation to the cutter; how to rough and finish-mill the piece; how to check for finished dimensions.

Milling Machine, The. (8 min) 16sd-\$14.25. USOE-Castle. OE11.

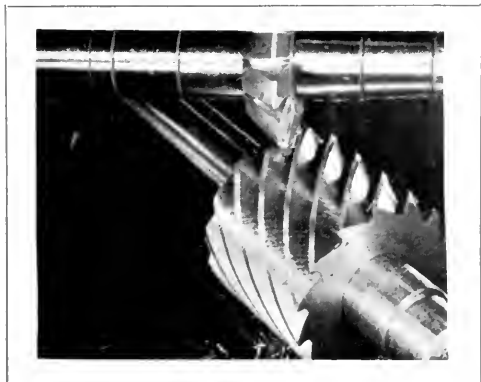
Illustrates the basic operating principle of the milling machine; how to set up cutters on the arbor; and how to control movements of the table by power traverse and by hand. Demonstrates the various types of jobs which can be done on the milling machine.

Milling Machine Operations. (2 reels) 16sd. FiPr.

The construction of the milling machine is analyzed and types of cutters are shown in action. Various kinds of milling, holding methods, and the variety of jobs adaptable to the machine are shown.

Plain Indexing & Cutting a Spur Gear. (26 min) 16sd-\$32.53. USOE-Castle. OE15.

Explains the principle and operation of the dividing head. Its application is shown in the cutting of an eight pitch spur gear with 36 teeth. Accuracy in setting up the work and mounting the cutter on the arbor is emphasized.



Milling a Helical Cutter (see above).

Straddle & Surface Milling to Close Tolerances. (27 min) 16sd-\$33.78. USOE-Castle. OE13.

Shows the rough milling of four sides of solid bar stock and finishing the same piece to a given size and shape. Animation explains the calculation of the width of spacing collars, correct location of the cutters on the arbor for straddle milling a T-bar, and required speed of cutter and table speed.

Straddle Milling. (17 min) 16sd-\$24.60. USOE-Castle. OE14.

Shows how to straddle mill the bosses on connecting rods to the proper width when the connecting rods are held in a fixture. Animation explains how to select spacing collars, for correct locations of four cutters, to mill bosses on both connecting rods at same time.

Study of Milling & Broaching. (30 min) 16si. GE.

Shows in detail milling machines operating under various conditions; over all photographs, and semi-micro detail of the effects and causes of chattering, variable angles; steel, cast iron and brass, conventional and climb angles; sharp and dull teeth, dry and fluid cutting, and relative arbor motions. The section devoted to broaching shows the same detail with fewer variables.

Using a Shell End Mill. (21 min) 16sd-\$27.71. USOE-Castle. OE72.

Shows how the vertical milling machine differs from other milling machines; how to produce a flat surface with a shell end mill; how to use the sliding head; what speed and feed are and how to calculate them.

S L I D E F I L M S

Machine Tools: The Milling Machine. AAF-Castle. FSI-5.

Gives nomenclature, practical uses and operation of the milling machine.

Milling Machines. (54 pictures-61 frames) Jam Handy.

What the milling machine is; basic cutter types; milling speeds and feeds; types.

Milling Machine Practice. (sd slides) rental or sale. Kearney.

A series of 5 slide films with sixteen inch records showing milling practice in all its phases.

PLANING & SHAPING

MOTION PICTURES

Basic Machines—The Shaper. (15 min) 16sd-\$22.58. USOE-Castle. OE70.

How the shaper removes metal; how motion is imparted to the ram; how the cutting tool is mounted; how the cutting tool is positioned; how the workpiece is mounted; how the cutting speed of the tool and the rate of table feed are adjusted.

Cutting a Keyway on End of a Finished Shaft. (13 min) 16sd-\$19.21. USOE-Castle. OE19.

Demonstrates the use of a shaper in cutting a keyway in a steel shaft. Shows how to select the cutting tools; how to secure the work in a vise; and how to set the length position, and speed of the ram stroke.

Machining a Cast Iron Rectangular Block. (25 min) 16sd-\$31.91. USOE-Castle. OE20.

Illustrates the use of parallel to set a block

in a shaper vise for machining all six surfaces square with each other. Demonstrates techniques for making finishing cuts. Setting the machine for the proper ram stroke, ram speed, dross, feed and depth of cut are illustrated.

Machining a Tool Steel V Block. (21 min) 16sd-\$27.71. USOE-Castle. OE21.

A solid rectangular tool-steel block is set up in a shaper vise after being laid out with V grooves and rectangular grooves. The proper setup of the work to assure parallelism of cut, and the method for selecting ram stroke, ram speed, cross feed, and depth of cut are shown. Proper selecting and setting of roughing and finishing tools are emphasized.

Planer & Shaper Operations. (10 min) 16sd. FiPr.

Shows machine operations. The construction is portrayed. Attention is paid to holding work and tool, and the effects of the machinery.

Planing a Dovetail Slide. (28 min) 16sd-\$35.95 USOE-Castle. OE67.

Shows how to set up the machine and the job; how to select and install the cutting tools; how to set the cutting tools to the workpiece; how to operate the controls of a planer; how to make the roughing cuts; how to make the finish cuts to the layout lines; how to measure the accuracy of the work.

Planing a Flat Surface. (22 min) 16sd-\$29.02. USOE-Castle. OE66.

Explains the function of a planer, the preparation of machine and tools, clamping the job on the table, setting the tool and table for the cut, and making the roughing and finishing cuts.

Study of Planing Operations. (1 reel) 16si. GE.

Highly magnified film shows a planer in slow motion. Using steel, cast iron and brass as the work material, the effect of high and low speeds and of cutting fluids are shown. Arbor deflection with relation to various materials is also shown.

S L I D E F I L M S

Machine Tools: Planers. AAF-Castle. FS1-6.

Gives nomenclature, practical uses and operation of the planer.

Machine Tools: The Shaper. AAF-Castle. FS1-7.

Gives nomenclature, practical uses and operation of the shaper.

Planers. (39 pictures-40 frames) Jam Handy.

Difference between the shaper and planer; construction features of the planer; types of work performed; planer tools; safety hints.

PRECISION MEASUREMENT. INSPECTION & TESTING

M O T I O N P I C T U R E S

Bevel Protractor, The. (15 min) 16sd-\$22.73. Castle. OE50.

Shows the principles of the vernier bevel protractor; how to set and read the bevel protractor; how to use the protractor to lay out angular work and to check angles on finished work; and how to care for the protractor.

Dial Indicator. (20 min) 1943. 16sd-color-sale or loan. FePr.

Teaches basic facts on how to use the dial indicator.

Dial Indicator Gages. (18 min) 1943. 16sd-color-sale or loan. FePr.

Teaches basic facts on how to use dial indicator gages.

Excursions in Science #6. (10 min) 1943. 16sd. GE.

The making of tiny coil springs of fibres of fused-quartz glass, used to measure small differences in weight. Demonstration of Alnico and Curie metals given.

Fixed Gages. (17 min) 16sd-\$23.98. USOE-Castle. OE3.

A demonstration of the use of snap, plug, ring, thread, screw-plug, and flushpin gages, emphasizing their importance in modern mass production. Care necessary to maintain their accuracy is stressed.

Gage Blocks & Accessories. (23 min) 16sd-\$30.79. USOE-Castle. OE246.

Shows why accessories are needed for gage blocks; how to inspect; a special plug gage, used for checking diameter of hole on a jig borer; an adjustable snap gage used on lathe work; a profile gage used to check an angle of a workpiece on the milling machine; first pieces from a production run; a ring gage; a screw thread pitch. Shows how to build a height gage and scriber.

Hardness Testing (Rockwell). (18 min) 16sd-\$25.22. Castle. OE149.

Shows the need for hardness testing; how to set up the Rockwell Hardness Tester; how to select and seat the penetrator; how to select and mount the anvil; how to test the accuracy of the machine; how to adjust the timing of the machine; and how to test flat and curved surfaces.

Height Gages & Test Indicators. (12 min) 16sd-\$18.59. USOE-Castle. OE5.

Shows the fundamental principles of the vernier height gage, together with various forms of standard indicators, and demonstrates their use. A vernier height gage is used to lay out holes on an angle plate. Standard indicators check the accuracy of the finished layout; also the flatness of a surface and the centering of work.

Inspection of Threads. (22 min) 16sd-\$28.33. Castle. OE148.

Shows how to identify the different parts of an American National Standard thread; how to inspect external threads with a roll snap gage; how to adjust the roll snap gage; and how to inspect internal threads with a plug gage.

Micrometer, The. (15 min) 16sd-\$22.73. USOE-Castle. OE2.

Shows the various forms of the micrometer—outside, inside and depth micrometers—the correct reading of the barrel and thimble scales, emphasizes their correct use and care.

Precisely So. (30 min) 1942. 16sd-free loan. GM.

A brief story of the growth of precision is followed by the modern ultimate in accuracy. Calipers, verniers, stop-go gages, radius gages, plugs, etc. are shown.

Precision Gage Blocks. (18 min) 16sd-\$25.22. USOE-Castle. OE49.

Shows how to calculate a stack of gage blocks; how to clean and assemble blocks; various uses of gage blocks in setting inspection gages; how to store gage blocks when not in use.

Steel Rule, The. (14 min) 16sd-\$21.49. USOE-Castle. OE1.

Shows how to read steel rules, and explains the fractional graduations; how to use the flexible

hook and rule-type depth gages and combination squares; how to lay out holes with a combination square; how to use inside and outside calipers to transfer dimensions to and from steel rules.

S L I D E F I L M S

Lay Out Tools & Measuring Instruments. (86 pictures-79 frames) Jam Handy.

What layout work is; tools used; use and care of measuring instruments.

Lay Out Work—Part I. (100 pictures-84 frames) Jam Handy.

The importance of accurate layout work; techniques used; basic geometric constructions.

Layout Work—Part II. (117 pictures-109 frames) Jam Handy.

Special layout problems on actual work examples.

Optical Inspection by Projection with Jones & Lamson Comparators. (67 frames) Jones & Lamson.

The comparator is a device for the inspection of mass production and tool room work by enlargement. An explanation of the operation of the machine and its use is given in detail.

MISCELLANEOUS

M O T I O N P I C T U R E S

Fundamentals of End Cutting Tools. (12 min) 16sd-\$18.59. USOE-Castle. OE43.

Shows the parts of the radius tool, the threading tool, the sheer cut finishing tool, the round nosed finishing tool, and the side facing tool, correct setting of the tools, and the type of cut each is ground to make.

Fundamentals of Side Cutting Tools. (11 min) 16sd-\$17.35. USOE-Castle. OE42.

Gives the name and location of each part of the tool; an explanation of the relationship between each part and the job the tool has to do; and an explanation of how the job of cutting metal and carrying off the heat generated affects the shape, the setting, and the care of a single point side cutting tool as used in lathe.

Machine Tools Used in Aircraft. (32 min) 16sd. Douglas.

Catalogs the various types of machine tools, used in cutting, shaping, drilling, and forming of sheet stock, bar metal and castings. Part I shows the machine shop tools, such as drills, engine lathes, turret lathes, radial drills, planers and mill cutters. Part II deals with the sheet stock tools such as shears, presses and power brakes.

New Murray Method of Shell Manufacture, The. (20 min) Murray.

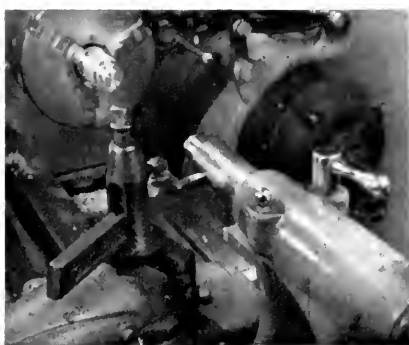
A war production film showing the short-cuts in making mortar shells.

Rotary Head Tool & Die Milling Machine. (22 min) 1940. 16sd-color. Kearney.

Explanation of this machine tool, its use and operation.

Rotary Machines. (2 reels) 1942. 16sd-\$46. Sd Masters.

Shows turning, flanging, and wire-reinforcing; operations on deep and narrow throated machines; and a survey is presented of all the different types of rollers used.



Fundamentals of End Cutting Tools

Shop Work. (30 min) 16si. Purdue U, General Engineering Dept.

Explains the function and operation of lathe, milling machine, drilling machine, shaper, and planer, and arbor press. It demonstrates turning, facing, boring, drilling, reaming, chamfering, thread cutting, gauging, chucking, knurling, centering, necking, tapping, index milling and planing.

Study of Punch Press Operation. (15 min) 16si. GE.

High speed, highly magnified study of a punch press slotting various materials of various thicknesses at different speeds. Frame and punch deflections are shown by distortion of two parallel steel scales mounted on the frame.

S L I D E F I L M S

Finishing Rough Casting. (50 frames) Jam Handy.

Parts of casting to be removed; detailed steps in finishing the casting; tools used.

Hinge Fitting. (26 pictures-22 frames) Jam Handy.

Making fitting; bending to definite shapes; bending blocks.

Machine Shop Mechanics. (82 frames) SVE.

Teaches groupings and uses of various types of tools; shows such machines as an engine lathe, turret lathe, vertical boring mill, planer, upright drill and cylindrical grinder. General survey of machine work and machines.

Other Specialized Machines. (49 pictures-45 frames) Jam Handy.

A discussion of the basic principles of broaches; slotters; boring mills, profilers, and hobbars; what they do and how they do it.

Scraping. (73 pictures-69 frames) Jam Handy.

Why scraping is necessary; tools used; techniques of scraping and checking finished work.

Slotted Anchor Plate. (42 pictures-40 frames) Jam Handy.

Proper use of layout tools; procedure in roughing out fittings; drilling small holes; hack-sawing slotted metal; cutting large holes; use of round and half round files.

Thread Grinding with Jones & Lamson Equipment. (43 frames) Jones & Lamson.

History of the development of the thread grinder to meet the demands of the aviation industry. Various sections of the machine are shown in detail.

Materials & Metals

ALUMINUM

MOTION PICTURES

Aluminum. (12 min) 16sd. OWI.

From ore through refining process to fabrication into sheets and then the building of airplanes.

Aluminum. (15 min) 1941. 16sd. EBFilms.

Mining, concentrating and processing aluminum. Aluminum oxide is prepared and reduced to metallic aluminum in electrolytic cells.

Aluminum: Fabricating Processes. (19 min) 1943. 16sd. Aluminum in cooperation with USBM.

The fabrication of aluminum into assorted forms is shown. Laboratory tests, and the making of containers by hydraulic extrusion are illustrated.

Aluminum: Mine to Metal. (30 min) 1943. 16sd. Aluminum in cooperation with USBM.

The mining and purifying of bauxite, mineral from which aluminum is extracted. Uses of aluminum in transportation, building, and industry.

Unfinished Rainbows. (36 min) 1942. 16sd-color. Modern.

The aluminum industry traced from Napoleon III's time to present. Hall's experiments of a cheaper way to process aluminum that has opened new fields of use.

SLIDE FILMS

Aluminum. \$2. SVE.

BALL BEARINGS

MOTION PICTURES

Care & Maintenance of Tapered Roller Bearings. (45 min) 16si. Timken.

Shows construction, operation and general maintenance principles of tapered bearings.

Micro Instrument Ball Bearings, Their Handling & Care. (22 min) 16sd. GM.

New Departure micro instrument ball bearings receive final inspection, assembly, and packing in completely sterile surroundings. Stresses the care to be given by users to insure the smooth running qualities of the bearings.



Heat Treatment of Steel (Hardening).

Quality in the Making. (23 min) 16sd. GM.

The numerous processes of testing and manufacturing of the high-grade steel used in ball bearing production are shown.

SLIDE FILMS

Bearings. (54 pictures-55 frames) 1940. si. Jam Handy.

Explains the fundamental differences in the various types of ball and roller antifriction bearings.

COPPER

MOTION PICTURES

Copper Leaching & Concentration. (15 min) 16si. Ph Dodge in cooperation with USBM.

Illustrates operations in preparation of copper ore for the smelter—crushers—ball mills—belt conveyors—classifiers; shows the operation of flotation cells in graphic diagram.

Copper Mining in Arizona. (45 min) 1938. 16si. Ph Dodge in cooperation with USBM.

Shows open pit and underground mining methods. Open pit includes diamond drilling, air drilling and blasting, churn drilling and blasting. Underground methods show tunnel driving, sinking wings and shaft with a rotary drill, scraping ore into chutes.

Copper Refining. (15 min) 1938. 16si. Ph Dodge in cooperation with USBM.

Shows the conversion of nodes into chemically pure copper by the electrolytic process.

Copper Smelting. (15 min) 1938. 16si. Ph Dodge in cooperation with USBM.

Shows the crushing, roasting, smelting procedures to convert ore and concentrates into metallic copper; shows removal of impurities in converters and anode furnaces; shows casting of metal into anodes.

Copper Smelting & Refining. (11 min) 16sd. Rothacker.

Explains the making of copper base.

From Mine to Consumer. (30 min) 1940. 16si-color Am Brass in cooperation with Copper.

Shows how copper ore is mined, smelted, and refined; the alloying of copper to make brass and the fabrication of copper and copper alloys in the form of sheets, wire rods, tube and special shapes.

Manufacture of Anaconda Sheet Copper. (15 min) 16si. Am Brass.

Shows processes and operations involved in the making of sheet copper from hot rolling of copper cakes to final trimming and inspection.

Mining & Smelting Copper. (15 min) 16si. U of Ill, Visual Education Bureau.

Shows the physical properties of copper, its mining and refining processes including concentration by smelting and electrolytes.

Mountains of Copper. (15 min) 16si. GE.

Shows the operation of world's largest open-pit copper mine.

Sheet Copper. (15 min) 16si. AMNH.

Manufacture and uses of sheet copper.

Story of Copper. (34 min) 1945. 16sd. Ph Dodge in cooperation with USBM.

Shows the complete story of copper; open pit mining at Morenci, Arizona, and the under ground mine at Bisbee, Arizona.

S L I D E F I L M S

Copper & Its Uses. \$2. SVE.

HEAT TREATMENT

M O T I O N P I C T U R E S

Airco Process of Flame Hardening. (1 reel) 16si-color. Air Reduction.

Various flame hardening operations on gears, sprockets, lathe way beds.

Flame Hardening by the Oxy-Acetylene Process. (30 min) 16si. Linde.

Animation illustrates the basic principles of oxyacetylene flame-hardening; shows actual process in plants. Animated diagrams show construction of flame hardening equipment, the action of the heating flames and water spray quench.

Flame Priming the Drum Gates of Grand Coulee Dam. (15 min) 16si. Linde.

Photography of actual operations as they progressed shows preparation by the oxyacetylene flame-priming process of the steel surfaces of the drum gates; shows flame-priming head, and the control of the gas flow through the blow-pipe.

Heat Treating Hints. (55 min) 16sd-color. Lindbergh.

Shows methods and procedures; the uses of oil, water, brine and lead quenches. Shows the processing of unusual, difficult sizes and shapes of hardened tools and accessories.

Heat Treatment. (20 min) 16sd. Navy.

Shows the latest methods of heat treating aluminum alloys.

Heat Treatment of Aluminum—Film I. (19 min) 16sd-\$27.10. USOE-Castle. OE344.

Explains purpose and phases of heat treatment; microstructure changes during heat treatment, heat treatment procedure, hardening processes, and effects on physical properties.

Heat Treatment of Steel: Elements of Hardening. (15 min) 16sd-\$22.58. USOE-Castle. OE170.

Shows how steel is quench-hardened; how the structures and hardness of steels with different carbon content change at progressive quench-hardening stages; how the lower and upper critical temperatures of steel are determined; how an iron-carbon diagram is constructed and what it shows.

Heat Treatment of Steel: Elements of Surface Hardening. (14 min) 16sd-\$21.95. USOE-Castle. OE172.

Shows how steel is pack carburized; how steel is gas carburized; how a thin, hard case is obtained by cyaniding; how nitriding is used to obtain a very hard case; how steel is flame hardened; how steel is induction hardened.

Heat Treatment of Steel: Elements of Tempering, Normalizing, Annealing. (22 min) 16sd-\$29.02. USOE-Castle. OE171.

Shows how steel is tempered; how the structure, toughness, and hardness of a plain carbon steel change at progressive tempering stages; how steel is normalized by furnace-heating and subsequent cooling in still air; how normalizing breaks up undesirable coarse grains and homogenizes the

structure; how steel is annealed by heating and cooling in a furnace; how annealing relieves stresses in steel and softens it.

Right Material in the Right Place. (20 min) 16sd. Int'l Harvester.

Explains the choice of materials for specific purposes; shows internal operation of various types of furnaces.

IRON & STEEL

M O T I O N P I C T U R E S

Alloy Steel. (40 min) 16sd-free loan. Bethlehem.

Shows the manufacture of alloy steel; smelting processes and fabrication of steel.

Alloy Steels—A Story of Their Development. (20 min) 16sd. CI Moly in cooperation with USBM.

Alloy steels from beginning to making of high speed tools.

Backbone of Progress. (30 min) 16sd. (45 min) 16si. AISC.

Shows the application of structural steel to buildings, bridges and other structures.

Bessemer & Open Hearth Steel. (15 min) 16si. Bray.

Brief, but concise, clear portrayal of the Bessemer process and the open hearth.

Empires of Steel. (45 min) 16si. AISC.

Shows the prefabrication of steel structures in the erection of the Empire State Building.

Enduro Stainless Steel. (40 min) 16sd-free loan. Rep Steel.

Covers the manufacture of Enduro Stainless Steel from the mining of the ore in Rhodesia to the mirror-finished sheet.

Furnaces of Industry. (10 min) 16sd-\$50; rent. B & H.

Entire process of making steel. Distribution of materials and smaller areas in Britain.

Heavy Industries. (10 min) 16sd. Vis Lib.

Pig iron being transferred to furnaces and mixed with ore, then poured into molds for castings and ingots.

How Steel Is Made. (40 min) 16sd. Bethlehem.

Blast furnace, bessemer furnace and open hearth operations. Animated drawings of what takes place in the blast furnace and open-hearth. Control of slag in the open-hearth. Spectrographic analysis. Still cross-sections of bessemer furnace, electric furnace, and cupola furnace in the foundry. Standard rolling operations. Hammer forges and press forges. Iron and steel foundry.

Iron & Steel. (10 min) 16sd. DeVry.

Shows the operation of mines, the transportation of ore, blast furnace and smelter, open hearth furnace, production of steel.

Iron Mining & Manufacture. (15 min) 1941. 16si-\$25; rent-\$1. Bailey.

Shows open pit mining near Marquette, Michigan, transportation to blast furnaces where pig iron is made, the smelting, molding, pouring and the finishing of castings ready for assembly.

Making & Shaping of Steel. (70 min) 16sd. (90 min) 16si. 1940. US Steel.

Reel 1: Raw Materials—begins with underground mining of iron ore, its transportation and delivery. Reel 2: The Making of Steel—open

hearth, electric furnaces, etc. Reel 3: Flat Rolled Products. Reel 4: Bars and Structural Shapes. Reel 5: Rails, Wheels, Axles. Reel 6: Wire and Wire Products. Reel 7: Pipe and Tube Manufacture.

Manufacture of Lukens Clad Steels. (20 min) 1942. 16si. Lukens.

Shows the techniques involved in bonding together a thick backing plate of steel and a lighter layer of corrosive resistant metal such as Inconel, Monel or Nickel. Depicts the hot spinning and flueing of heads of these clad steels.

Manufacture of Pig Iron. (10 min) 16si. Bray.

Animation shows the blast furnace in operation, the charging, the blowing in of air, elimination of impurities, the handling of slag and molten iron.

Manufacture of Structural Steel Shapes & Related Products. (40 min) 16sd. Bethlehem.

Shows the operation of the blast furnace, open hearth, and other mill departments; shows rolling processes.

Manufacture of Tool Steel. (30 min) 16si-color. Columbia Tool.

Shows the addition of alloys and heat treatment in the processing of steel into tool steel.

Men Make Steel. (45 min) 16sd-color (80 min) 16sd-B & W. US Steel in cooperation with USBM.

Gives the background of the steel industry.

New Continuous Process of Making Iron & Steel Sheets. (30 min) 16si. Armco.

Open hearth, continuous rolling, finishing processes are shown.

Stainless Steel. (29 min) 16sd. Allegheny Ludlum.

Shows each step in production of stainless steel.

Steel. (25 min) 1937. 16sd-loan. AISC.

Complete story of steel.

Steel. (20 min) AI&SI.

Steel making with off-screen description of production processes.

Steel. (10 min) 1938. 16sd-\$27; rent-\$1.50. Cutlough.

Shows the manufacture of steel from liquid pig iron to finished product. Hardened steel is cut like cheese by a metal 1000 times harder than that which it cuts.

Steel. 16sd-color. Vulcan.

Step by step routine in manufacture of fine steel tools.

Steel—Man's Servant. (38 min) 1938. 16sd-color-loan. US Steel.

Description of steel industry from the mining of ore to the finished product.

Story of Carbon Steel. (30 min) 1945. 16sd. USBM.

Shows manufacture of carbon steel.

Story of Steel. (11 min) 16sd. rent-\$1.50. B & H.

Materials: ores, oxides, magnite, chemite, and siderite. Iron mining. Location of steel mills with reference to raw materials and transportation. Blast furnaces, Bessemer converter, open hearth, rolling mills, loading with magnets, role of steel in world today.

Streamlined Steel. (40 min) 16sd. Bethlehem.

Shows manufacture of hot and cold rolled sheets and strips in modern steel making.

There's a Job to be Done. (30 min) 16sd. Allegheny Ludlum.

Shows the manufacture of alloy steels.

USS Cor-Ten. (20 min) 16sd. US Steel.

Tells the story of a low alloy, high-tensile steel, its use in fields of transportation and allied industries; shows tests and emphasizes weight saving in design.

World's Largest Plate Mill, The. (25 min) 1940. 16si. Lukens.

Pictures the making and rolling of steel from the ore in the open hearth furnace to the plates finished and ready for fabrication. Shows hot spinning of rounded ends of steel pressure vessels and the hot pressing of thick plates into shape.

S L I D E F I L M S

Iron & Steel. \$2. SVE.

Iron Industry in Pennsylvania. \$2. University Museum-SVE.

Occupations in the Steel Industry. \$2.25. Voca Guidance-SVE.

Steel. (4 films) sd. Voca Film.

1. Where Does Steel Go? 2. Steel Stands the Gaff; 3. What It Takes to Make Steel; 4. The Steel Dollar—Where It Goes.

Steel. (slides) AISC.

Institute lists slides under the following general headings: Manufacture of Steel; Fabrication of Structural Steel; Erection; Welding and Welded Structures; Tall Buildings; Theatres and Assembly Halls; Garages; Airport Structures; Stadia; Miscellaneous Buildings and Structures; Miscellaneous Structural Details for Buildings; Skyride, Chicago Fair; Steel H-Piles; Steel Dams; Rigid Frame Buildings and Bridges; Arch Bridges; Cantilever Bridges; Plate Girder Bridges; Truss Bridges; Suspension Bridges; Continuous Bridges; Movable Bridges; Grade Crossing Elimination and Traffic Control; Winning Designs, A.I.S.C. Annual Student Bridge Design Competition; A.I.S.C. Annual Bridge Awards; Bridge Railings and Miscellaneous Details; Floors.

What Iron & Steel Mean to Us. \$2. Long-SVE.

LEAD

M O T I O N P I C T U R E S

Lead. (15 min) 1930. 16si. EBFilms (write for nearest distributor).

Shows elementary processes in mining of ore and smelting; how metal is used in industry and the Dutch Boy method of making white lead.

Lead Milling, Smelting, & Refining. (34 min) 1940. 16sd-loan. St. Joseph in cooperation with USBM.

Shows processes for converting the mined lead ore into finished products.

Lead Mining in Southeast Missouri. (33 min) 1940. 16sd-loan. USBM.

Diagrammatic drawings show geological formations in Southeast Missouri; shows mining of lead.

S L I D E F I L M S

Lead. \$2. SVE.

MOTION PICTURES

Magnesium—Metal From the Sea. (23 min) 1944. 16sd. Dow in cooperation with USBM. Animated drawings and straight photography show the production of magnesium from sea water and from the salt mines under the earth's surface.

Magnesium—The Miracle Metal. (10 min) 1945. 16sd. Atlas.

Story of magnesium from sea to finished castings is told including molding, machining and other processes.

Story of Magnesium, The. (10 min) 16sd. Hills-McCanna.

Shows mass productions of cores and molds; the pouring of castings, inspections, machining, heat-treating, ageing, and laboratory tests.

MICA

MOTION PICTURES

Mica Industry. Mario.

Mining and preparation of mica.

NICKEL

MOTION PICTURES

Men, Metals & Machines. (35 min) 1942. 16sd-loan. Rothacker.

Shows the world's largest nickel rolling mill in operation.

Nickel. (30 min) 1935. 16si-loan Int'l Nickel in cooperation with USBM.

Mining of nickel ore; smelting, and electrolytic refining and casting are shown. Shows the making of alloys, handling of ingots, and pouring of molds.

Nickel & Nickel Alloys. (32 min) 1943. 16sd-loan Int'l Nickel in cooperation with USBM.

Shows the production of nickel and nickel alloy sheets from the arrival of copper-nickel matte at the plant, through the processes necessary to turn out the finished sheets.

Nickel Milling & Smelting. (17 min) 1940. 16sd-loan Int'l Nickel in cooperation with USBM.

Crushed ore is fed to classifiers and rod mills for further crushing and sizing. Depicts flotation process. Nickel concentrates and copper concentrates are carried to thickeners, then filter; dehydrated, weighed and carried to smelter storage bins. Shows smelter where ore is roasted; ore and coke loaded into blast furnaces; slagging converters; pouring matte; cooling; breaking up matte for refining and rolling.

Nickel Mining. (16 min) 16sd-loan. Int'l Nickel in cooperation with USBM.

Shows mining processes from men going to work and all their varied tasks in mining nickel.

Nickel Refining. (10 min) 1940. 16sd. Int'l Nickel in cooperation with USBM.

Shows refinery producing electrolytic nickel, black nickel oxide and nickel shot, illustrating processes used.

Story of Monel Metal. (30 min) 16si. (10 min) 16sd. Int'l Nickel; Douglas.

Shows manufacture of this nickel alloy including fabricating processes.

MOTION PICTURES

Arteries of Industry. (5 reels-15 min each) 16si. Nat'l Tube.

Five reels which may be used in any combination. 1. Mining of Ore-blast furnace operation; Bessemer Converter process of making steel. 2. Open hearth process of making steel—blooming and rolling mill operation. 3. Butt-weld process of making pipe—galvanizing pipe. 4. Lap-weld process of making pipe and tubes. 5. Seamless process of making pipe.

Making of Cold Drawn Seamless Steel Tubes, The. (40 min) 16sd. Florez.

Shows making of seamless steel tubes from billets to finished tubing.

Oxwelded Industrial Piping. (12 min) 16si. Linde.

Shows pipe used in industry: 16-inch high-pressure steam line installed in a modern railway terminal; fabrication of 56ft header for power plant; steam and fire piping systems installed in 40 story building; galvanized coils in the air conditioning in skyscraper.

Walls Without Weld Pipes. (60 min) 16si. Nat'l Tube.

1. Mining of ore, blast furnace operations, open hearth process of making steel. 2. Blooming mill and rolling mill operations. 3. Manufacture of hot finished pipe and tubes. 4. Cold drawing seamless pipe and tubes.

PLATING

MOTION PICTURES

Hard Facing. (30 min) 16si. Linde.

Shows application of Haynes Stellite, Hascrome, Haystellite alloys to metal parts; shows the ways in which hard-facing is used to increase efficiency of caisson, plowshares, farm implements, dipper bucket teeth, automobile valve seats.

Haynes Stellite the Plowshare. (15 min) 16si. Linde.

The operations involved in preparing plowshares for hard-facing with Haynes Stellite alloy.

Steel Plus. (40 min) Bethlehem.

The making of tin plate and its applications in canning, toy making and household wares.



Magnesium—Metal From the Sea

S L I D E F I L M S

Protection of Metals—Part I. (58 pictures-53 frames) Jam Handy.

Preventing corrosion; protective coatings; types of corrosion: oxidation and intercrystalline—causes—plating process and coatings—metallizing—anodizing—metal-greasing—uses of light oil—application of Lion oil—polishes—painting and varnishing.

Protection of Metals—Part II. (33 pictures-30 frames) Jam Handy.

Finishing materials—spraying lacquer—water-proofing—preparing metal surfaces for finishing—application of finishes—metallizing surfaces.

TIN

M O T I O N P I C T U R E S

Tin. (15 min) 1930. 16si. EBFilms.

Animation and straight photography show processes of making tin plate from mining of tin in the Federated Malay States to finished product in factories in the United States.

WIRE

M O T I O N P I C T U R E S

Fabrication of Copper. (45 min) 1939. 16si-free loan Ph Dodge in cooperation with USBM.

Shows manufacture of copper wire, insulated cables and other uses of copper.

Office Practice

M O T I O N P I C T U R E S

Advanced Typing: Duplicating & Manuscript. (26 min) 16sd-\$23.76. Navy-Castle. MN1512d.

Demonstrates the proper method of making masters for duplicating machine use, correcting mistakes on a stencil, use of the electromatic hectograph machine, and means of making symbols which are not on the typewriter.

Advanced Typing: Shortcuts. (35 min) 16sd-\$31.59. Navy-Castle. MN1512e.

Stresses the importance of good posture and proper arrangement of equipment. Demonstrates how to type columns of figures, use carbons, make neat erasures, type cards, envelopes, labels, stapled forms, and draw lines on the typewriter.

Basic Typing: Machine Operation. (29 min) 16sd-\$26.65. Navy-Castle. MN1512b.

Demonstration of typing at different speeds ranging from 35 to 180 words per minute. Shows use of alignment scale, type guide, line space adjusting lever, touch control, and other controls on the typewriter.

Basic Typing: Methods. (31 min) 16sd-\$28.37. Navy-Castle. MN1512a.

Traces the development of the typewriter and shows the techniques of typing: posture and position, principles of the keyboard, method of striking keys, proper feeding of paper.

Discipline: Giving Orders. (15 min) 16sd-\$14.10. Navy-Castle. MN2088a.

Stresses the importance of disciplining a per-

Manufacture of Wire Products. (15 min) 16si. U of Ill.

Shows the processes involved in making wire from raw materials to all sorts of finished wire products.

Modern Steel & Wire Mills. (10 min) 16sd. (15 min) 16si. Venard.

Shows how steel is made, drawn and woven into fencing; nail making; and barbed wire making.

Sinews of Steel. (40 min) 16sd. Bethlehem.

Deals with the manufacture and use of wire rope from raw material to finished product.

Wire. (40 min) 16sd. Bethlehem.

Shows the manufacture of rod and wire; zinc coating wire by galvanizing and the Bethanizing processes; the making of Bethanized fence, barbed wire, nails and other wire products.

MISCELLANEOUS

S L I D E F I L M S

Gold & Silver. \$2. SVE.

Mining & Metallurgical Engineering as a Career. \$2. SVE.

Properties of Metal—Part II. (30 pictures-39 frames) Jam Handy.

Metals and alloys used in airplane construction: steel, aluminum (alloys), copper, brass, bronze, monel metal, inconel, stellite, magnesium. Classification of metal according to chemical composition. Uses of metals in airplane. Working aluminum.

Zinc. \$2. SVE.

son properly and giving orders clearly. Shows the results obtained in an office where emphasis is placed on gaining the workers' confidence, and making threats and instilling fear in the employees.

Discipline: Reprimanding. (10 min) 16sd-\$9.11. Navy-Castle. MN2088b.

Shows several examples of proper and improper reprimanding of employees by supervisors and how the efficiency and production of an office can be increased or decreased depending on how the situation is handled.

First Impressions. (21 min) 16sd-\$19.29. Navy-Castle. MN1374.

Discusses reasons why new employees may not like their jobs and gives some primary steps in giving them a good first impression of their work.

Four Steps Forward. (28 min) 16sd-\$26.07. Navy-Castle. MN1372.

Outlines a four point system for instructing new employees and explains and dramatizes each point.

Machine Transcription: Machine Operation. (15 min) 16sd-\$14.67. Navy-Castle. MN1562a.

Explains the purpose of the dictating and transcribing machines, and demonstrates the operation of the Dictaphone and Ediphone types. Demonstrates reshaving a cylinder, how to set controls and the proper method of removing the cylinder from the machine.

Machine Transcription: Transcription Technique. (22 min) 16sd-\$19.86. Navy-Castle. MN1562b.

Demonstrates the proper method of phrasing, how to control and phrase dictation at various speeds, how to prepare for a day's work, compose a letter and correct errors in the transcription on the cylinder.

Maintenance of Office Machines. (37 min) 16sd-\$33.89. Navy-Castle. MN1513.

Care and maintenance of typewriters, transcribing machines, dictaphones, adding machines.

and calculators are discussed. Protection against dust, dirt and carelessness are stressed.

Take a Letter, Please. (22 min) 16sd-\$20.44. Navy-Castle. MN1562c.

Burlesques the common faults of dictators, such as: the scatterbrain, who isn't prepared, the speed demon, dreamer, mumbler, and Simon Legree. Shows the proper way of dictating and the use of the Ediphone and Dictaphone.

S L I D E F I L M S

Do You Know Your Typewriter? \$2. SVE.

Optical & Photographic Industries

M O T I O N P I C T U R E S

Behavior of Light. (15 min) 1930. 16si-\$24. EBFilms.

Subject of light; ideas of transmission, shadows, and eclipses. The formation of images in plane, convex, and concave mirrors. Cause of refraction; dispersion, color, and the rainbow.

Beveling, Grooving & Rounding. 16sd. Navy-Castle. MN2449a.

Shows techniques involved in grooving, beveling, and rounding both flat and curved surfaces. The importance of beveling the edges of all optical surfaces to prevent chipping, and adaptation of surface grinder for grooving. Demonstrates two common types of rounding machines.

Centering, Edge Grinding, & Beveling—Spherical Surfaces. (27 min) 16sd-\$33.78. USOE-Castle. OE185.

Shows how to center lenses by collimator; how to set up lenses for edge- and bevel-grinding in a single spindle or two spindle machine; and how to edge and bevel grind lenses.

Curves of Color. (10 min) 1941. 16sd-color-loan. GE.

Tells the story of color; explains the scientific device, the recording photoelectric spectrophotometer.

Eyes of Science. (45 min) 1930. 16si. Bausch and Lomb.

Reel 1 shows the physical aspects of lenses. Gives an illustrated conception of the action of light rays bending and reflecting. Reel 2 is devoted entirely to products of Bausch and Lomb Company.



Highlights and Shadows (see Col. 2).

Fine Grinding-Spherical Surfaces. (15 min) 16sd-\$22.11. USOE-Castle. OE183.

Shows how to set up lenses in a multiple spindle machine; how to adjust the grinding machine for grinding concave or convex lenses; and how to wash and inspect the lenses after fine grinding.

Heights & Depths. (10 min) 16sd. Jam Handy.

Shows the making of engravings of various kinds; reproductions from wood cuts; making of zinc etchings from line drawings; making of half tone photograph reproductions for both the flat bed press and the cylinder or rotary press; photogravure pictures.

Highlights & Shadows. (55 min) 1939. 16sd. Eastman Kodak.

Tells the story of the modern camera, its discovery, perfection and growth through modern industrial research methods. Shows camera used in inspection methods; shows making camera lens, lens grinding, and the manufacture of film.

Lenses. (15 min) 1931. 16si. EBFilms.

Shows by animation lens refraction; action of converging lens, real and virtual images, changes of magnification; effect of a diverging lens and formation of a virtual image; construction and explanation of achromatic lenses.

Light Waves & Their Uses. (10 min) 1937. 16sd. EBFilms.

Includes a comprehensive explanation of the principles of reflection with plane, concave and convex mirrors. Refraction is illustrated with lenses and special reference to the human eye. The principles and applications of interference are demonstrated by Michelson's interferometer. Polarized screens, the electromagnetic spectrum and the quantum theory are covered.

Manufacture of Refractories. (65 min) 16si. Har.

Reels 1 & 2: Manufacture of fireclay refractories. Reel 3: Manufacture of silica refractories. Reel 4: Conclusion of manufacture of silica refractories and manufacture of magnesite and chrome refractories. Reel 5: Scenes in research and control laboratories.

Modern Lithographer. (10 min) 16sd. EBFilms.

Depicts the techniques of lithographic artists and the processes of duplicating black and white and color originals by means of direct and photo-offset lithography. The roles of the commercial photographer and modern printing press in mass production of prints and advertising materials.

Pitch Buttoning & Blocking—Spherical Surfaces. (30 min) 16sd-\$37.24. USOE-Castle.

OE182.

Shows how to warm lenses and pitch for buttoning; how to apply pitch to warm lenses; how to fit form tool on lens surface; and how to block lenses in metal sheet preparatory to fine grinding.

Polishing-Spherical Surfaces. (28 min) 16sd-\$35.02. USOE-Castle.

OE184.

Shows how to make a concave or convex polishing shell; how to trim the polishing shell to size and cut breathers; how to set up and use the polishing machine; how to make a Newton's ring check with test glass; and how to correct for hollow condition and high condition.

Rough Grinding by Pin-Bar—Spherical Surfaces. (19 min) 16sd-\$26.47. USOE-Castle.

OE181.

Shows how to use the job card; how to select and adjust the grinding tool; how to use abrasives; how to grind by pin-bar; how to clean the grinding tool; how to correct worn grinding tools.

Rough Grinding—Flat Surfaces. 16sd. Navy-Castle.

MN2449e.

Demonstrates procedures for grinding flat optical surfaces by the hand method. Covers blocking of prisms to planoplate, procedures for hand grinding, cleaning of mill, inspection, measurement, de-blocking, grinding of large pieces of optical glass, and edge grinding.

Rough Grinding—Spherical Surfaces. (26 min) 16sd-\$33.15. USOE-Castle.

OE180.

Explains three methods of rough grinding lenses—by hand, by pin-bar, and by mechanical curvature generator—and shows hand grinding in detail. Shows how to use the job card; how to

check tool curvature; how to handle lens blanks during hand grinding; how to check lens curvature; and how to clean grinding tool.

Rough Grinding With Curvature Generator—Spherical Surfaces. Navy-Castle.

MN2449d.

Demonstrates rough grinding of spherical surfaces by means of the curvature generator process and shows: the theory, function, and operation of the curvature generating diamond grinding wheel. Emphasizes the necessary adjustments to be made throughout the proceedings.

Through Galileo's Telescope. (10 min) 1937. 16sd-\$27; rent-\$1.50. Gutlohn.

Shows Galileo and his optic tube; the world's largest telescope and demonstrations of its operation.

World's Largest Telescope Reflector. (10 min) 1940. 16sd-\$36; rent-\$2. B & H.

The scientific recording of the grinding and polishing of the two hundred inch telescope at the Observatory at the California Institute of Technology.

S L I D E F I L M S

Care & Cleaning of Photographic Lenses. AAF-Castle.

FS1-48.

Emphasizes care of the lens to insure proper functioning, and precautions to be observed in their use. Shows methods of cleaning.

Properties of Photographic Lenses. AAF-Castle.

FS1-47.

Function of the lens; pinhole lenses; focal length of lenses; size of image; necessity for focusing the lens; and inversion of the image.

Petroleum Industry

M O T I O N P I C T U R E S

Basic Principles of Lubrication. (25 min) 16sd. GM.

Explains the principles and functions of proper lubrication; to reduce friction in order to increase efficiency; to cool moving parts and internal surfaces; to keep power in the cylinder; and to prevent contamination and deterioration of engine parts.

Deep Horizons. (40 min) 1941. 16sd. Texaco.

From the determining of location of oil by the seismograph to final production of oil; drilling operations, the setting of pipe, its removal and the setting of casing is shown.

Evolution of the Oil Industry. (36 min) 1939. 16sd. (60 min) 1939. 16-35si. Sinclair, in cooperation with USBM.

Shows equipment used in oil industry and the operations of changing crude petroleum into petroleum products: the construction of petroleum and natural gas pipe lines. Includes development of petroleum from the first oil well in America. Scientific apparatus and methods used in prospecting for oil.

Flight Log. (23 min) 1914. 16sd. Shell; Modern.

Story of the development and commercial production of 100 octane aviation gasoline. Tells of the teamwork of test pilots and engine designers and petroleum scientists whose combined skills, courage and vision have created American

planes which are today writing history in the battle of the world.

Friction Fighters. (11 min) 16sd. Texaco.

The effects of subjecting lubricating oil to excessive heat and cold.

Inside Story, An—Oil. (30 min) 16sd. Socony.

Application and use of lubricants on gears, cylinders, and bearings. Problems of lubrication are covered.

Lubrication. (30 min) 1942. 16sd-free loan. Sinclair, in cooperation with USBM.

Describes theory of friction and the application of lubricants. Illustrates useful friction, such as wheel traction and braking systems. Shows various types of oil for different uses; range of petroleum lubricants in six main classes: 1. spindle oils to lubricate machinery with high speed, but little pressure; 2. internal combustion engine oils; 3. gear oils; 4. steam cylinder lubricants; 5. greases for heavy-duty, slow moving machines; 6. machine tool lubricants used in cutting metals.

Lubrication of the Gasoline Engine. (13 min) 1941. 16sd-free loan. Shell.

Demonstrates rolling, solid and fluid friction; explains the principles of friction and lubrication. Cohesion between solids and adhesion between solids and liquids are illustrated. A cut-away automobile engine reveals the working of the valves and pistons. The use of an oil cushion in the bearing and the working of the piston rings are shown in animation.

Master of Molecules. (30 min) 1943. 16sd-color. Texaco.

Crude oil is carried through the cracking and refining processes which turn it into gasoline.

More Power to You. (10 min) 16sd. Sun Oil.

Narrated by Lowell Thomas, the refining and distribution of petroleum is shown. (condensed version of *Sincerely Yours*)

Oil. (10 min) 16sd. Calumet.

Shows oil types and oil qualities in lubrication of rough surfaces and internal combustion engines. In laboratory demonstrations, shows "heart cut" oil. Shows methods of testing gumming, carbon residue, viscosity, and corrosion.

Oil Filter Goes to War. (25 min) 16sd. Purolator.

Animated drawings show principles of filter construction, servicing, cleaning, and reassembly of filters.

Oil From the Earth. (20 min) 16sd. BIS.

The story of crude oil and its finished products; animated diagrams and pictures show how oil was formed and became deeply imbedded under many strata of earth's surface. A drilling machine is shown in operation, the bits are changed and reason for their use is shown. Casings are placed down the side of the well, and a stream of mud forces out the borings. When oil is reached, shows laying of miles of pipe lines by which the oil reaches distillery.

Petroleum Geology. (30 min) 16sd. rent-\$4.50. B & H.

Astronomy, geology, and paleontology furnish science introduction to the work of the oil-geologist who tells the driller where to sink his hole and how deep to go. Changing topography of North America traced and co-ordinated.

Pipe Line. (17 min) 1941. 16sd. Shell.

Shows the ten-ton shovels and the boomcats that make oil lines possible.

Principles of Lubrication. (16 min) 16sd. USOE-Castle. OE355.

The film shows the need for lubrication and the properties and action of lubricants. Conditions determining proper viscosity are discussed.

Refining of Crude Oil. (15 min) 1930. 16si. EBFilms.

Steps in distilling gasoline and kerosene; oil distillates, fuel oil, paraffin wax, lubricating oil; asphalt; "cracking" uses of these products.

Refining of Petroleum. (10 min) 16si. Bray.

Story of the oil refinery and what takes place in the refining of crude oil. Animated diagrams show cracking process.



Inside Story (see Page 66).

Riding the Film. (10 min) 1941. 16sd-\$36. Jam Handy.

Problems of lubrication, in photography and animation. The path of oil from pump to main bearings, valves, connecting rods, and other working parts is shown.

Sincerely Yours. (28 min) 16sd. Sun Oil.

The story of petroleum production, refining and distribution. Narrated by Lowell Thomas.

Story of Gasoline. (30 min) 1939. 16si. Standard Oil in cooperation with USBM.

Story of the gasoline industry; consumption; distribution. Shows products distilled and refined from crude oil and tests made to perfect gasoline.

Story of Lubricating Oil. (30 min) 16si. Standard Oil in cooperation with USBM.

Reel 1 stresses importance of lubricants to machinery; shows by flow diagram principal steps in refining, removal of paraffin wax, removal of petrolatum. Reel 2 continues flow diagram; removal of undesirable constituents, purification of lubricating stocks. Shows manufacture of greases, and shows tests for viscosity, pour test, carbon residue, and demulsibility.

10,000 Feet Deep. (20 min) 16sd. Shell; Modern.

Shows present day methods of oil exploration and oil drilling through the measure of time required for sound waves to travel to reach the earth's surface after striking various strata.

S L I D E F I L M S

Gasoline, The Manufacture of. \$2. SVE.

What Is Good Gasoline. sd. Florez.

Deals with the fuel requirement of the modern internal combustion engine, plus a story on the manufacturing of gasoline.

Physics

MOTION PICTURES

Air Pressure in Which We Live. 16si. Bray.

Laboratory demonstration of the collapse of an evacuated metal can, and the drawing of a shelled hardboiled egg through a narrow bottle-neck by vacuum suction.

Einstein's Theory of Relativity. (30 min) 16si. rent-\$2. B & H.

Simple photographic proof of relativity of many

of our basic concepts of time, weight, space, size, direction and speed.

Energy & Its Transformation. (10 min) 1933. 16sd-\$50. EBFilms.

Potential, kinetic and radiant energy, as manifested in mechanical, electrical, chemical, and thermal forms are explained and illustrated by such devices as the pile driver, the water turbine, and a dynamite explosion. Representations of levers and pulleys are used to illustrate the relation of "energy" to "work" and "power."

TRAINING FILMS

Excursions in Science #3. (10 min) 1945. 16sd. GE.

Taking the X out of X-Ray. Explanation of the X-Ray tube by its inventor, Dr. William D. Coolidge.

Experiments in Physics. (12 min) 16si. rent-\$1. B & H.

Various physical phenomena as demonstrated by models in the Hall of Science, A Century of Progress Exposition.

Fundamentals of Acoustics. (10 min) 16sd-\$50. EBFilms.

Describes the modification of sound waves between the source and the hearer and portrays the physiology of hearing. Animation illustrates the principles of velocity, refraction, range of hearing, lowering intensity, attenuation in air, eliminating high and low frequencies, reverberation, and focusing. Sound effects clarify the animated action. Reference is made to the advances in communication coming from an increased knowledge of sound and electricity.

Gravitation of Liquids. 16si. Bray.

First two, then five liquids are shown to possess definitely different densities.

Heat, Light, Sight. (15 min) 16si. Bray.

Boiling water in paper container over open flame; how light travels, effects of various types of lenses on light rays; how the eye works, and comparison of eye with camera.

On the Level. (10 min) 16sd. Jam Handy.

Shows how inertia is affected by weight.

Peculiarities of Air. 16si. Bray.

Laboratory experiments demonstrating water boiled with ice, and cotton burned with liquid air.

Principles of Dry or Solid Friction. (17 min) 16sd-\$25.17. USOE-Castle. OE365.

Contains an introduction to the principles, advantages and disadvantages, and forces involved in dry or solid friction. Demonstrates the calculation of forces and coefficients of static and kinetic friction.

Simple Machines. (11 min) 16sd-\$50. EBFilms.

Shows basic features of the lever, the inclined plane, the wedge, the pulley and the screw. Applications of these to modern complex machines are demonstrated. Animated drawings clarify mechanical principles.

Smooth Starts. (10 min) 16sd. Jam Handy.

Illustrates the law of inertia; its application to starting of airplanes, boats, locomotives, and automobiles.

Sound. (12 min) 16sd-\$30; rent-\$1.50. Edit PS. Recorded by the Victor Co.

Vibrations of wires; violin strings are heard, illustrating high and low tones with variations. Shows the effect of vibrations on other objects.

Sound Recording & Reproduction. (10 min) 1943. 16sd-\$50. EBFilms.

Demonstrates sound converted into light rays to produce sound motion pictures, and then how the projector is able to change the light rays back to sound waves. Sound recording by variable area and sound recording by variable density are visualized.

Sound Waves & Their Sources. (10 min) 16sd-\$50. EBFilms.

Demonstrates and explains several types of sound sources. The transmission of sound waves through the air is visualized. The characteristics of sound waves, such as frequency, ampli-

tude, wave length, fundamentals, harmonics, are explained visually with acoustic accompaniment. The high-speed camera and oscilloscope help to clarify the phenomena portrayed.

Transfer of Power. (22 min) 1941. 16sd-\$22.50; rent-75c. BIS; Shell-producer. Made in England.

Animated diagrams explain the principle of leverage. The application of this principle to the geared wheel is illustrated, first by ox-pulled wooden wheel, then by wind power; and then by mechanical power on a geared water wheel. Animated diagrams show the principles involved in the design of the gears.

Vibratory Motions & Waves. (20 min) 16sd-\$75; rent-\$2.50. Edit PS.

Illustrates the simple harmonic motion of the tuning fork in slow motion photography. In slow motion and animation shows damped, undamped, stationary and propagating waves. Wave length, phase, crest, trough, nodes, antinodes, condensation and rarefaction are defined. Transverse and longitudinal waves are treated.

S L I D E F I L M S

Centrifugal Force. (59 pictures-60 frames) Jam Handy.

Force needed to hold a body in a curved path—centripetal force, equal and opposite centrifugal force.

Energy. (46 pictures-62 frames) Jam Handy.

The idea of work, and the use of the potential-kinetic formula—conservation of energy.

Force. (55 pictures-57 frames) Jam Handy.

Nature of force; how to measure it; units expressed to these measurements and how they can be graphically represented.

Force & Velocity as Vectors. (50 pictures-60 frames) Jam Handy.

The idea of vector quantities; how they are employed in calculations; the use of force and velocity as vectors; conditions required to produce equilibrium.

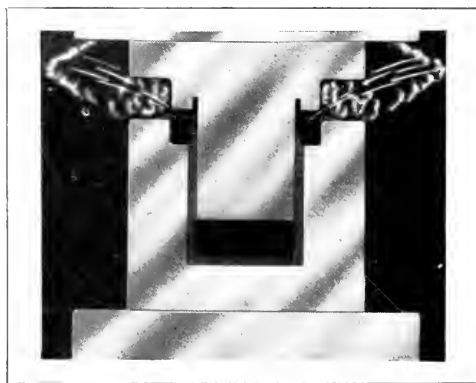
Friction. (51 pictures-53 frames) Jam Handy.

Kinds of friction; how they are measured and how they effect motion.

Gravitation. (41 pictures-49 frames) Jam Handy.

Gravitation as a universal attraction; historical significance; effects upon the ether.

Light. \$2. Vis Sci-SVE.



Plastics #4—Molding a Simple Part

Matter. (43 pictures-50 frames) Jam Handy.

The most important properties of matter; three physical states in which matter is found; constitution of matter as viewed today.

Mechanical Linkage. (58 pictures-53 frames) Jam Handy.

Explaining the simpler and basic forms of mechanical linkage—levers, gears, eccentrics, cogs, etc.—and the meaning and significance of mechanical advantage.

Mechanical Movements. (37 frames) Vis Sci.

Key diagrams illustrating principles involved in transmitting various types of motion.

Mechanics—Part I. (43 frames) SVE.

Structure and properties of matter; Pascal's law; Archimedes' principle; specific gravity; barometers and pumps; Boyle's law.

Mechanics—Part II. (31 frames) SVE.

Forces; acceleration; Newton's laws; momentum; principle of moments; parallel forces; the lever; work; simple machines; kinds and transformation of energy.

Newton's Laws of Motion. (43 pictures-58 frames) Jam Handy.

Laws dealing with inertia, change of momentum and interaction; forces involved in motion.

Physics. (7 films) Vis Sci.

Diagrammatic representations: 1. Mechanics, Parts I & II; 2. Heat; 3. Sound; 4. Light; 5. Magnetism; 6. Electricity.

Power. (30 pictures-32 frames) Jam Handy.

It is assumed that the ideas of work and energy are understood before this film is used; time and energy relationship.

Principles of Physics. (38 frames) SVE.

Tells how heat is produced; what heat is and

how it is measured. Explains changes in state brought about by heat.

Rotary Motion. (91 pictures-86 frames) Jam Handy.

Gyroscopes and certain action of winds; applications to navigation and meteorology; analogous use of linear motion.

Simple Machines. (84 pictures-84 frames) Jam Handy.

Definition of a machine; ratio of output to input; losses due to friction; effect of increase of force on distance; levers; the inclined plane; pulleys; the wheel and axle.

Sound. \$2. Vis Sci-SVE.

Uniformly Accelerated Motion. (48 pictures-55 frames) Jam Handy.

How acceleration is related to time, velocity, and distance.

Uniform Motion. (36 pictures-48 frames) Jam Handy.

Understanding of the formulae of uniform or "steady" motion and their uses. The scope of this film is limited to the motion proper and is not concerned with the causes or effects of the motion that would involve the additional idea of force.

Units of Measurement. (30 pictures-47 frames) Jam Handy.

Laws and facts as frequently expressible in mathematical language; quantities requiring expression in proper units; development of systems of measurement and need for standards; kinds of units used and field where each kind finds widest application.

Work. (35 pictures-51 frames) Jam Handy.

Idea of work in physics is different from its popular use, although there is some similarity; work is not done until there is some motion.

Plastics Industry

MOTION PICTURES

Care & Cleaning of Plexiglas. (20 min) 16sd. Rohm & Haas.

Presents inspection, storage, and use of masking paper; cutting, repairing, cementing ribs, cleaning and buffing to eliminate scratches.

Careers for Cellulose. (30 min) 16sd-color. Hercules.

Forming of cotton linters into cellulose derivatives. From the chemical bases are made cellulose plastics, lacquers, film, rayons.

Lucite Carving. (11 min) 1941. 16si-\$21; rent-\$1.50. Gutlohn.

The use of machinery in the carving of lucite, as well as hand carving.

Magic of Modern Plastics. (40 min) 16sd-color. Breskin.

Manufacture of cellulose nitrate and vinyl acetate resin in all stages.

New World Through Chemistry, A. (20 min) 1941. 16sd-color-free. Dupont.

Shows nylon textile fiber; neoprene synthetic rubber; cellulose sponges; Zelan finish; synthetic dyestuffs, and lucite plastic.

Plastics #1—Origin & Synthesis of Plastics Materials. (16 min) 16sd-\$23.87. USOE-Castle. OE166.

Shows structural resemblance of plastics com-

pounds to wood in a tree; the synthesis of plastics from natural substances; the differences between thermosetting and thermoplastic materials; the compounding of plastics to provide desired properties in products; the forms in which plastics are produced.

Plastics #2—Methods of Processing Plastics Materials. (21 min) 16sd-\$32.73. USOE-Castle. OE467.

Shows the fundamentals of the compression, transfer, extrusion, and injection molding methods; finishing molded parts; fundamentals of lamination; machining laminated and other plastic products.

Plastics #3—Compression Molding. Part I: Preparing the Charge & Loading the Mold. (11 min) 16sd-\$17.71. USOE-Castle. OE468.

Shows how to set up the press; how to weigh the charge; how to preheat the charge; how to clean and lubricate the mold; how to load the mold.

Plastics #4—Compression Molding. Part II: Molding a Simple Part. (10 min) 16sd-\$17.07. USOE-Castle. OE469.

Shows how to close the mold; how to breathe the mold; how and when to open the mold; how to prevent pieces from warping; how to coordinate steps of molding cycle.

Plastics #5—Molding a Part With Inserts. (10 min) 16sd-\$17.07. USOE-Castle. OE470.

Shows how transfer molding differs from com-

pression molding; how to determine if a part should be molded by the transfer method; how to mold a part by the transfer method; how to coordinate the steps of the molding cycles.

Plastics #6—Semi-Automatic & Hand Molding of Intricate Parts. (16 min) 16sd-\$23.87. USOE-Castle. OE471.

Shows how to mold a part with undercuts; how to place wedges and to close the mold; how to mold a part with complicated shape; how to assemble a hand mold; how to disassemble a hand mold.

Plastics #7—Injection Molding. Part I: Setting Up the Press & Molding a Part. (16 min) 16sd-\$23.87. USOE-Castle. OE472.

Shows what happens in the plunger cylinder, heating cylinder, and mold during injection molding; how to set up an injection molding press for a specified job; how to avoid dampness and contamination of molding material; how to maintain the operating cycle and prevent damage to the mold and press.

Plastics #8—Injection Molding. Part II: Cleaning & Servicing the Press. (11 min) 16sd-\$18.36. USOE-Castle. OE473.

Shows how to disassemble the heating cylinder; how to clean the cylinder, hopper, and feeder mechanism; how to give the entire press a routine cleaning; how to prepare scrap material for re-use.

Plastics #9—Finishing Molded Parts. (14 min) 16sd-\$21.95. USOE-Castle. OE474.

Shows trimming the gate; drum-sanding gate and cable hole; retapping metal inserts; removing flash from contours by hand-sanding and filing; filing and scraping cavities; buffing and polishing the surfaces; finishing by tumbling methods.

Plastics #10—Machining Laminated Plastics. (19 min) 16sd-\$27.10. USOE-Castle. OE475.

Shows how to cut tube stock to length; how

to machine outside diameters to specifications by turning on a lathe; how to machine inside diameters to specifications by boring on a lathe; how to machine pockets on a milling machine.

Product Design & Molding Technique for Thermosetting Plastics. 16sd-Loan. Bakelite—Princeton.

Technique and practical application of thermosetting molding plastics.

Proving Ground. (25 min) 1944. 16sd. Celanese.

A Celanese plastic, Lumarith transparent packaging material . . . its use in war and its widening usage in postwar packaging.

Selecting the Right Thermosetting Molding Material. 16sd-loan. Bakelite—Princeton.

Technique and practical application of thermosetting molding plastics.

Shape of Things to Come. (33 min) 1944. 16sd-color-loan. Boonton.

A trip through company's plastic material factory showing operation of presses, compression transfer and injection, with step by step illustration of mold construction. Use of machine tools and finishing operations shown. New method of heat molding compounds by radio frequency currents is covered.

Story of Bakelite. (30 min) 16si-rental loan. Bakelite.

Animated diagrams of chemical operations involved in manufacture of Bakelite materials.

Story of Formica. (46 min) 1944. 16sd-color. Formica.

Uses made of laminated plastics and their role in the future.

This Plastic Age. (30 min) 1943. 16sd-color. Breskin.

Manufacture of plastics, molding, extruding into forms. Illustrates basic facts of the difference of plastics from other materials.

Refrigeration Industry

PRINCIPLES

MOTION PICTURES

Principles of Refrigeration. (20 min) 16sd-\$27.09. USOE-Castle. OE360.

Explains the basic physics of heat transfer, with refrigeration as a method of heat transfer from the inside of a refrigerator to the outside. Shows by means of animation both the compression and the absorption systems.

COMMERCIAL UNITS

MOTION PICTURES

Adjusting & Repairing the Thermo Expansion Valve. (12 min) 16sd-\$18.59. USOE-Castle. OE448.

Explains the theory of multiple refrigeration systems; shows the types of thermo expansion valve; and shows how to test and adjust the thermo expansion valve, how to recognize symptoms of trouble in the valve, and how to service the valve.

Adjusting Commercial Thermostatic Controls. (12 min) 16sd-\$17.97. USOE-Castle. OE450.

Explains the purpose of the thermostatic motor control, and the safety principle of the high pressure safety cut out and the principles of the thermostatic element of the two-temperature valve. Shows how to test and adjust the thermostatic motor control and how to adjust the thermostatic two-temperature valve and thermostatic water valve.

Adjusting Pressure Actuated Temperature Control Devices. (15 min) 16sd-\$22.73. USOE-Castle. OE449.

Explains the purpose of pressure actuated temperature control devices and shows how to adjust the pressure actuated motor control; how to adjust the metering type two-temperature valve and the snap action two-temperature valve; and explains the purpose of the suction line check valve.

Making & Repairing Tubing Connections. (18 min) 16sd-\$25.22. USOE-Castle. OE452.

Shows how to straighten copper tubing; how to work, cut, and dress copper tubing; how to make a flare for various sizes of tubing; and how to sweat in a connector to cover a break.

Servicing Water Cooled Condensers. (12 min) 16sd-\$18.59. USOE-Castle. OE451.

Explains the theory of a counter-flow condenser, the essential elements of a water cooled system, and the operation of the electric water valve; and shows how to regulate a water valve, how to purge a system, and how to detect a dirty condenser.

DOMESTIC UNITS

MOTION PICTURES

Adding or Removing Refrigerant. (17 min) 16sd-\$24.60. USOE-Castle. OE441.

Shows how to check a domestic refrigeration system for lack of refrigerant; how to add refrigerant for leak-testing; how to add refrigerant by weight; how to add an unmeasured amount of refrigerant; and how to remove refrigerant.

Adjusting & Checking the Expansion Valve. (21 min) 16sd-\$27.71. USOE-Castle. OE444.

Shows the design and operation of the bellows type automatic expansion valve and the diaphragm type automatic expansion valve; and how to adjust, check, and service the bellows type valve.

Checking & Replacing a Float Valve. (19 min) 16sd-\$26.47. USOE-Castle. OE445.

Shows the function and action of the two basic types of float valves—high-side float and low-side float; how to correct troubles in both types, and how to replace a high-side float.

Checking the Electrical System. (17 min) 16sd-\$24.60. USOE-Castle. OE446.

Shows how to check and service an overheated motor in a domestic refrigerator; how to check and service a stalled capacitor or R. I. motor; how the thermostatic motor control functions; how to check and service motor control disorders; the elements of range and differential adjustments.

Checking the System—Part I: General Procedures. (17 min) 16sd-\$24.60. USOE-Castle. OE438.

Shows how to install gages in a domestic refrigerator; how to check operating pressures, compressor performance, and the temperature range of the cooling unit; and how to clean the condenser, and oil the motor of an open-type refrigeration unit.

Checking the System—Part II: Trouble Shooting. (17 min) 16sd-\$24.60. USOE-Castle. OE439.

Shows how to install the gage manifold in a



Checking the System—Part II

domestic refrigerator; how to check abnormal head pressure and abnormal back pressure; and how to determine causes of several common troubles such as, "unit will not run," "no refrigeration but the unit runs continuously," and "improper refrigeration of food but unit freezes ice cubes."

Locating & Repairing Leaks. (17 min) 16sd-\$24.60. USOE-Castle. OE440.

Shows how to use the gage manifold in building leak-testing pressures in a domestic refrigerator; how to test for sulphur dioxide and methyl chloride leaks; how to use the halide torch to locate freon leaks; and how to repair several types of leaks.

Quieting a Noisy Refrigerator. (16 min) 16sd-\$23.35. USOE-Castle. OE447.

Shows how to check and correct noise caused by high head pressure, or oil-logged evaporator; how to correct compressor noises; how to check and correct motor noises; how to correct noises caused by wear or looseness of parts.

Removing & Installing a Compressor or Condenser. (17 min) 16sd-\$23.98. USOE-Castle. OE442.

Shows how to evacuate and remove a compressor in a domestic refrigerator; how to evacuate a stuck compressor; how to install the compressor; how to remove and install condenser.

Removing & Installing a Cooling Unit. (19 min) 16sd-\$26.47. USOE-Castle. OE443.

Shows common cooling unit disorders in a domestic refrigerator; how to evacuate valved evaporators; how to remove an oil-logged evaporator; how to install the evaporator; how to install a direct expansion cooling unit.

Sheet Metal Shop

MOTION PICTURES

Bar Folder. (10 min) 1942. 16sd. Sd Masters.

Shows the use and care of the bar folder, methods of making flanges, hems, and other sheet metal work. Close-up photography shows every working part of the machine, its adjustments.

Bending & Curving. (40 min) 16sd. Navy.

Presents method of bending and curving long, narrow parts to desired shapes.

Blanking & Piercing. (15 min) 1943. 16s. Aluminum in cooperation with USBM.

Shows how to design tools with proper clear-

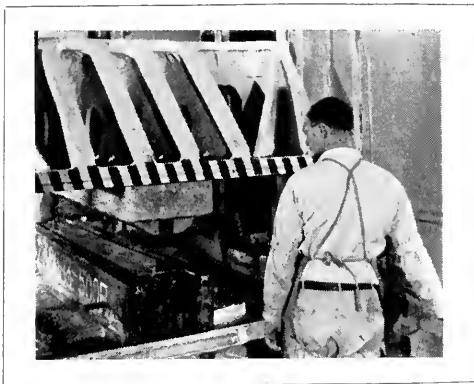
ance, to set up tools for best results; how to lubricate thoroughly. Shows how to lay out sheet aluminum economically; shows techniques employed in cutting blanks and piercing holes in aluminum sheet.

Blanking & Punching. (30 min) 16sd. Navy.

Presents economical methods of cutting sheet metal to size, including shearing, sawing, punching, routing and gang drilling.

Blanking Sheet Metal on the Squaring Shear. (15 min) 16sd-\$22.73. USOE-Castle. OE130.

Shows how to lay out tapered blanks on an aluminum sheet; how to set and adjust front



Forming With a Drop Hammer (see Col. 2).

and back gages and side stops; how to use hold downs and treadle; how to check blanks and further adjust machine; how to trim blanks. Animated drawings are used to explain operations of the shear.

Blanking Sheet Metal With Hand Snips. (18 min) 16sd-\$25.22. USOE-Castle. OE131.

Shows how to care for and adjust the sheet metal snips; how to select snips for the job to be done; how to cut along a straight line; how to cut an outside circle and a notch; how to cut an inside line; how to remove burrs left by cutting.

Blanking With Swing Arm Router. (17 min) 16sd-\$23.98. USOE-Castle. OE132.

Shows how to operate a swing-arm router; how to set up the work and template for routing; how to change router bits; how to rout internal contours; and how to rout external contours.

Cornice Brake. (20 min) 1942. 16sd-\$10. Sd Masters.

Shows the use and care of the cornice brake, its adjustments, the bends, flanges, etc. that can be made on the cornice brake.

Drawing, Stretching & Stamping. (22 min) 1943. 16sd. Aluminum in cooperation with USBM.

Illustrates alloys best suited for drawing and stretching; shows single and double-action presses making cylindrical, rectangular and odd-shaped parts from aluminum sheets. Shows stamping, embossing, coining aluminum; how the choice of alloy influences tool design, clearances, radii, and reduction per draw.

Filing Template Metal. (15 min) 16sd, \$22.73. USOE-Castle. OE129.

Shows how to clamp template metal on a bench and in a vise; how to select the correct file for each job; how to grip the file for different jobs; how to file a square edge and remove burrs; how the wrist is rotated for filing inside curves; how to file inside rectangles and remove fillets from corners. For illustration, a straight edge, an inside oval, an outside contour template, and an inside rectangle are used.

Finish Forming By Hand. (16 min) 16sd-\$23.35. USOE-Castle. OE135.

Shows the tools and methods used for holding small aluminum bulkheads during forming; the grip of the mallet handle and the free movement of wrist and hand during forming (in slow motion); the successive stages of forming with a flat fibre strip (around the bend of the flange, along the flat of the flange and the final smoothing); the successive stages of shrinking large wrinkles with a forming tool; marking excess

metal with a surface gage; and checking finished work with a contour template. In illustrating these operations, a long narrow bulkhead and a bulkhead having a sharp radius are used.

Forming Methods. (40 min) 16sd. Navy.

Shows the forming of flat parts by the use of drop hammers, punch presses, hydraulic and stretch presses.

Forming on a Hand Operated Brake. (17 min) 16sd-\$24.60. USOE-Castle. OE134.

Shows how to lay out work for bending in a hand operated brake; how to set up brake for bend angle and bend radius; how to check test pieces and finished work; how to operate brake.

Forming on Rotary Machines. (17 min) 16sd-\$24.52. USOE-Castle. OE290.

Illustrates forming a part on a slip-roll machine, marking bend lines, adjusting the rolls, and checking the part with a radius template. Shows the adjustment of a beading-roll machine, the forming of a bead at a specified edge distance, and the forming of shallow and final beads.

Forming on the Stretching Machine. (16 min) 1945. 16sd-\$24.52. USOE-Castle. OE251.

Parts of the stretch press; how to operate the stretch press; how to set up the machine for a job; how to handle the production run.

Forming With a Drop Hammer. (16 min) 1945. 16sd-\$25.17. USOE-Castle. OE291.

Purpose and nature of drop hammer forming; how to operate the pneumatic hammer; how to set up the punch and die; how to handle the production run on a single-hit job; how to dismantle the setup; how to use draw rings on a deep-draw job.

Forming With Rubber on the Hydraulic Press. (11 min) 16sd-\$17.35. USOE-Castle. OE133.

Shows how sheet metal parts are formed with rubber on a hydraulic press; how to set up the work in the press; and how to operate the press. Also shows how a large power press operates, and how small hand presses compare with power presses.

General Sheet Metal Practice. (20 min) 16sd. Aluminum in cooperation with USBM.

Shows forming of aluminum sheet by manual and mechanical devices; shows bending, beading, hammering, flanging, edging; how to compensate for springback; and how to care for tools used.

How to Form Aluminum. 1944. 16sd. Aluminum in cooperation with USBM.

Shows processes in manufacturing aluminum; may be shown in series or in separate units:
(16 min) Blanking and Piercing
(22 min) Drawing, Stretching, and Stamping
(21 min) General Sheet Metal Practice
(17 min) Spinning
(14 min) Tube and Shape Bending
(See description by title in this index)

Jigs & Fixtures. (10 min) 16sd. McFarland.

Shows dies in cross section drawing to illustrate operation. Flow of metal shown in animation.

Sawing Template Metal. (17 min) 16sd-\$23.98. USOE-Castle. OE128.

Shows how to use a job selector chart for width, pitch, set of teeth, and speed; how to identify raker, wave, and straight teeth; how to mount a saw blade on a hand saw; how to select and adjust blade guides; how to saw to a lay-out line; how to "chew out" metal from a notch; how to remove burrs.

Spinning (Aluminum). (17 min) 1943. 16sd.
Aluminum in cooperation with USBM.

Shows three methods of spinning aluminum: partly by hand, partly mechanically, entirely mechanically. Shows aluminum alloys most suitable for spinning.

Tube & Shape Bending. (13 min) 1943. 16sd.
Aluminum in cooperation with USBM.

Shows proper procedure in bending aluminum tubing and shapes, keeping tube round at point of bend. Shows use of filler, mandrels and other supporting devices.

S L I D E F I L M S

Care & Use of Hand Shears, The. Navy-Castle. SN30.

Demonstrates several kinds of shears and snips, including the straight, the slitting, the circular, the left hand and the right hand. Shows how they work, their care, and the proper method of using them.

Draw Bench Operations. Navy-Castle. SN258.

Explains the purpose of the draw bench, demonstrates how a pattern is made, shows how the draw bench is set up for the pattern, and demonstrates how the machine is operated.

Flanged Parts Tray. (94 pictures-65 frames)
Jam Handy.

Layout procedure when bend allowances must be computed; stretching metal over forms; making flat patterns or stretchouts; rolling and braking sheet metal to dimensions; squaring shear, cornice brake, bar folder; forming angles to curves; assembling, fitting and riveting parts.

Making a Round Metal Container. Navy-Castle. SN292.

Shows correct procedures for making a round sheet metal container, including cutting the metal, making the flanges, hammering the lock seam, and constructing the head around the top.

Making Curved Flanges. Navy-Castle. SN291.

Shows in detail the tools and steps used in hand forming a flange on a disk and the corners of a rectangular tray, both of which are made of aluminum.

Metal Bumping & Hot Shrinkage. (52 pictures-63 frames) Jam Handy.

Instructions in the fundamentals of bumping sheet metal and in "hot shrinking" stretched sheet metal.

Sheet Metal Work. \$2. SVE.

Tool Box—Part I. (69 pictures-43 frames)
Jam Handy.

How to lay out, make and assemble the bottom, sides, ends, and corners—reinforcing angles—laying out light weight sheet metal for trim, bends, flanges, offsets, hems, beads, slots, corners and rivet holes—forming of parts by hand shears, squaring shears, hand snips, cornice brake, bar folder, beading rolls—center punching, drilling, regulating, and riveting of laid out rivet holes. (Supplementary printed material is furnished.)

Tool Box—Part II. (34 pictures-29 frames)
Jam Handy.

Top and tray of tool box laid out on and fabricated from lightweight sheet metal—scribing centerlines to locate positions—bending top to a fifty-four degree angle and illustration of bend angle formula—laying out and forming of rivet holes, slots, hems and bend lines—use of tin-smith's oval head rivets—square drilling and riveting of end pieces. (Supplementary printed material is furnished.)

Tool Box—Part III. (56 pictures-49 frames)
Jam Handy.

Simplicity of hardware design—how to lay out, form and assemble simple hinges, hasps, staples, staple plates, sleeve type handles, handle clips, tray supports and tray stops—rod work added to sheet metal work—fitting and setting in place of fabricated hardware—finished tool box painted and ready for use. (Supplementary printed material is furnished.)

Shipbuilding Industry

COPPERSMITHING

MOTION PICTURES

Bending Copper Tubing To a Wire Template. (22 min) 16sd-\$28.33. USOE-Castle. OE102.

Shows how the tubing is annealed, cooled, and filled with rosin; how a wire template is made; how bends are marked on copper tubing; how bends are made and checked; and how to remove puckers which are too large or too closely spaced.

Brazing Flanges With Spelter. (19 min) 16sd-\$26.47. USOE-Castle. OE103.

Shows how copper tubing is prepared for flanges; how flanges are fitted for brazing; how borax is applied before brazing flanges; how tube and flange are brazed over a forge; and how brazed flanges are prepared for installation on the hull.

Brazing Flanges With Silver Solder. (13 min) 16sd-\$19.21. USOE-Castle. OE104.

Shows how tubing and silver brazing flanges are fitted; how flux is applied; how heat is applied to draw silver solder in and out; and how to clean flange after soldering.

Tinning & Solder Wiping. (26 min) 16sd-\$32.53. USOE-Castle. OE343.

Shows how to clean copper tubing for tinning; how flux is applied to copper; how to tin copper tubing by hand and by dipping; how solder wiping is done; and how copper reacts to heat when being tinned and solder wiped.

MARINE ELECTRICITY

Identifying & Precutting Cable. (19 min) 16sd-\$26.47. USOE-Castle. OE112.

Shows how cable is precut and put on reels; how cable is salvaged; how to identify the VCLA cable used in merchant ships; and how cable is measured in circular mills and with an American wire gage.

Installing & Connecting Telltale Panel. (15 min) 16sd-\$22.11. USOE-Castle. OE116.

Shows how to lay out telltale unit; how to remove insulation from cable; how to reinsulate conductors and cable; and how to connect conductors to the multi-connection box.

Laying Out & Installing Compartment Fixtures. (12 min) 16sd-\$18.59. USOE-Castle. OE114.

Shows how to locate installations on a plan-view blue-print which gives no dimensions; how to lay out ceiling fixtures and studs; how to burn a hole for passage of cable and how to install ceiling fixtures.

Laying Out & Installing Kickpipes & Stuffing Tubes. (16 min) 16sd-\$23.35. USOE-Castle. OE110.

Shows how to distinguish the three types of kickpipes; how to lay out penetration areas; how to lay out and install single kickpipes; and how to lay out stuffing tube areas.

Laying Out & Installing Main Wireway. (21 min) 16sd-\$27.71. USOE-Castle. OE111.

Shows how to lay out and install raceways and wireways; how to calculate the width of a hanger to be used; how to use the 8:1 radius rule; how to determine the spacing of hangers; and how to overcome obstacles in the route of the raceway.

Pulling & Installing Cable & Packing Terminal Tubes. (16 min) 16sd-\$23.35. USOE-Castle. OE113.

Shows how to pull, strap, and straighten cable; how to prepare cable for pushing; how to prepare cable for pulling with a rope; and how to pack terminal tubes.

Wiring Telltale Panel. (17 min) 16sd-\$23.98. USOE-Castle. OE115.

Shows the purpose of telltale units; how to strip cable; how to form and lace conductors on a jig; how to strip conductor ends and put on lugs; and how to hook up conductors and test connections.

MARINE MACHINERY INSTALLATION

MOTION PICTURES

Aligning & Installing Auxiliary Machinery. (17 min) 16sd-\$23.98. USOE-Castle. OE96.

Shows how to lay out foundations for machinery installations; how to establish centers of holes for drilling; how to drill bolt holes in foundations to blueprint specifications; how to align machines accurately on foundations; and how auxiliary machine installations are checked.

Filing & Installing Chocks. (15 min) 16sd-\$22.73. USOE-Castle. OE97.

Shows how chocks are used in machinery installation; how they are surfaced smoothly and accurately and adjusted to given tolerances; how a machine is leveled by using chocks; how measurements are made for preparing chocks; how Prussian blue and chalk are used for adjusting chocks; how feeler gages are used in chock installation; and how foundation and chocks are drilled for bolts.

How to Check & Surface Foundations. (19 min) 16sd-\$25.85. USOE-Castle. OE95.

Shows the main engine and variety of ship's auxiliary machines; the basic lines of a ship; how to check the location of machinery foundations to blueprint specifications; how to align and level foundations; and how to surface or smooth foundations.

Installing Valves & Strainer on Sea Chest. (13 min) 16sd-\$19.21. USOE-Castle. OE99.

Shows how studs are ordered for tapped flanges; how studs are driven; how driven studs are checked for accuracy of driving; how valves are installed on sea chests; and how strainer is prepared for installation and installed on sea chest.

Laying Out & Installing Stern Tube, Tail Shaft & Propeller—Part I: Running a Temporary Line. (22 min) 16sd-\$28.95. USOE-Castle. OE100.

Shows how the propeller post is prepared for running a temporary line; how targets are installed at the fore-and-aft end of the line; how to adjust a line to the center of bulkhead openings; how to eliminate the sag when a line has been run; how a temporary line check for proper position is made.

Laying Out & Installing Stern Tube, Tail Shaft & Propeller—Part II: Laying Off Bulkheads. (15 min) 16sd-\$22.73. USOE-Castle. OE101.

Shows how to measure on bulkheads from the temporary line; how to establish the center of bulkhead openings after the line is taken out; the purpose of laying off the bulkheads; and when to run the permanent line.

Laying Out & Installing Stern Tube, Tail Shaft & Propeller—Part III: Running a Permanent Line & Boring. (32 min) 16sd-\$39.16. USOE-Castle. OE341.

Shows how to run the permanent line; how to establish reference marks on bulkhead, propeller post, and doubler ring; how to install and adjust the boring bar; and how to rough-bore and finish-bore to specifications propeller post and various bulkheads.

Laying Out & Installing Stern Tube, Tail Shaft & Propeller—Part IV: Fitting Tube, Shaft & Propeller. (29 min) 16sd-\$35.64. USOE-Castle. OE342.

Shows how the stern tube is installed and made secure; how the tail shaft is installed; how the propeller is swung into position and lined up; how the fairway cap and rope guard are installed; and how the tail-shaft assembly is secured for launching.

Laying Out, Drilling, & Tapping Flanges on Sea Chest. (19 min) 16sd-\$26.47. USOE-Castle. OE98.

Shows the component parts of a sea chest; how sea chests function; how flanges are prepared for valve installation; how locations of flanges are checked; how flanges are leveled to make metal-to-metal contact with valve bearing surfaces; how stud hole centers are laid out; and how stud holes are drilled and tapped.

PAINTING

SLIDE FILMS

Painting Ships & Boats: Preparing the Surface for Paint: Preparing Paint. Navy-Castle. SN76a.

Shows the preparation of a surface to be painted, the necessary tools, and the safety precautions to be followed for both inside and outside painting. Suggests that every seaman should have some knowledge of painting.

Painting Ships & Boats: Applying Paint: Safety Precautions. Navy-Castle. SN76b.

Points out the different brushes and tools used in painting and gives instructions as to the proper way of applying paint. Some results of faulty applications are illustrated.

PIPEFITTING

MOTION PICTURES

Covering Hot & Cold Pipes. (22 min) 16sd-\$28.95. USOE-Castle. OE109.

Shows purpose of insulation; methods and

tools used in applying various types of insulating materials; how to prepare paste and cut and paste canvas; types of stitches and how to use needle for sewing canvas; how to cover flanges; and types of materials used to cover cold pipes.

Cutting & Threading Pipe by Hand. (12 min) 16sd-\$18.59. USOE-Castle. OE106.

Shows types of fittings and their use; use of pipe vise; use of cutter and hacksaw; swedging and its removal by reaming; selection and use of dies; proper threading and pipe thread taper.

Cutting & Threading Pipe on a Power Machine. (17 min) 16sd-\$23.98. USOE-Castle. OE107.

Shows function and principal parts of power pipe threader; proper use and care of dies and cutting tools; proper lubrication; swedging effect and removal by reaming; and how to correct thread that is too large.

Installing Valves in Engine Room Systems—Part I. (12 min) 1945. 16sd-\$19.00. USOE-Castle. OE123.

Explains the purpose of valves; identifies the principal engine-room units; shows the cycle of steam in engine room system; shows design and functions of basic type valves; reviews three major types of valves.

Installing Valves in Engine Room Systems—Part II. (16 min) 1945. 16sd-\$23.87. USOE-Castle. OE124.

This visual aids unit shows the installation of a globe valve in the main steamline; typical installations of the gate, angle, and swing-check valves; and installations of flanged valves with threaded fittings, and a threaded valve where clearance is needed.

Installing Vitreous Fixtures. (19 min) 16sd-\$25.85. USOE-Castle. OE121.

Shows correct handling of vitreous china fixtures; how to lay out, drill, and tap the seating; how to measure and cut brass studs; how to make water tight installations; how to assemble and connect the flushometer.

Laying Out & Installing Hangers. (19 min) 16sd-\$26.47. USOE-Castle. OE120.

Shows the principal types of hangers used in marine pipe-fitting—stool, angle iron bracket, strap, rod, and saddle—and how to install them; how to determine correct length for hanger legs; and how to measure and cut hanger legs.

Making a Cold Bend on a Hand-Powered Machine. (13 min) 16sd-\$19.21. USOE-Castle. OE108.

Shows why bends in pipe are necessary; gives maximum and minimum pipe size for cold bend-

ing by hand; shows use of hand bender; methods used in measuring for bends using proper bend ratio and how to use table of factors; and how to use templates.

Measuring Pipe, Tubing & Fittings. (15 min) 16sd-\$22.73. USOE-Castle. OE105.

Explains types and sizes of pipe and tubing; various weights and types of fitting—screwed, bolted, and welded; shows need for accurate measurement; explains ID and OD; shows how to measure for fittings, offsets and bends.

Pipe Fabrication With Jigs. (22 min) 16sd-\$28.33. USOE-Castle. OE122.

Shows the purpose of the jig and how to plan its layout; how to lay out and assemble targets for a jig; how to set targets and hangers using a pipe section as a template; how to fabricate pipe on a jig.

SHIPFITTING

MOTION PICTURES

Bulkhead: Laying Off & Fitting a Center-line Stiffener. (16 min) 16sd-\$23.35. USOE-Castle. OE31.

Shows how to lay off and set a center T-bar stiffener to a watertight bulkhead. Emphasizes advance planning of the work for the most economical cutting of the T-bar stiffener and tipping bracket from an I-beam, laying off of stiffener and brackets from templates, and the necessity for constant checking with the blueprint. Shows how to cut a T-bar stiffener tripping bracket from an I-beam, how to back mark and mark the 4-, 8-, 12-, 16-, 20-, and 24-foot water lines on the T-bar stiffener; how to fit the tripping bracket to the end of the main bracket; how to tackweld the stiffener to the bulkhead ready for production welding.

Bulkhead: Setting a Transverse Watertight Bulkhead Into Hull. (17 min) 16sd-\$24.60. USOE-Castle. OE32.

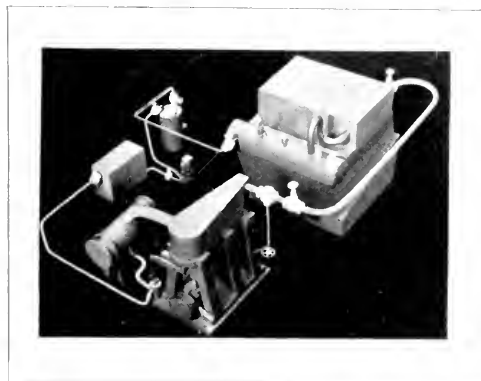
Shows how to strike and mark lines and lower the bulkhead into the hull; how to use ribbands to keep the bulkhead fair during this process; and how the bulkhead is moved to get exact alignment of the lines on the bulkhead with those previously marked off on the hull.

Deck Girders: Sub-Assembly. (15 min) 16sd-\$22.11. USOE-Castle. OE28.

Emphasizes the necessity for proper understanding and correct reading of the blueprint. Explains the purpose of deck girders and shows where they are located. Shows how a transverse deck girder is made from a split T-bar with a filler bracket in the web of the split end and how to guide the filler bracket into perfect alignment for tack welding using a dog.

Deckplates: Regulating & Setting. (16 min) 16sd-\$23.85. USOE-Castle. OE33.

Shows the setting, fairing, regulating and fitting of the deck plates of a ship. Animation shows how plates are placed in strakes outboard from the center line and the location of each strake of plates with exact reference to the center or buttock line marked on the ship and on the plate. Shows how deck plates are drawn into position for welding using steamboat jacks, ratchet and angle bar clips, and bolts; the purpose of the root opening; the use of liner wedges, dogs and flat bar fairing strips to provide flush joints for welding and the use of the strongback to strengthen a plate bent during welding.



Installing Valves in Engine Room Systems

Deck, The: Setting a Web Frame & a Transverse Beam. (17 min) 16sd-\$24.60. USOE-Castle. OE29.

Shows how to lay off center lines, frame lines, and buttock lines on the deck of a ship, how to fit and set the horn girder, and how to shift the girder. Explains the location of web frames and deck beams and illustrates camber. Shows the parts of the web frame that support this deck beam and the various holes that have been cut in each. Shows how to strike the center line and check the resulting squares by the 6-8-10 system, and how to center a deck beam.

Innerbottom Section: Sub-Assembly of a Closed Floor: Sub-Assembly of an Open Floor. (18 min) 16sd-\$25.22. USOE-Castle. OE25.

Shows purposes of vertical keel, flat keel, keelson, floors, stiffener, battle plate and universal mold; the laying off of closed floor from a template; locating and fitting a vertical stiffener, a flat bar ring for lightening hole and a face plate; types of punch marks used and their significance; and locating, setting, and fitting a T-bar stiffener and tack welding it in position.

Innerbottom: Setting Up Floors & Longitudinals. (18 min) 16sd-\$25.22. USOE-Castle. OE26.

Shows how to set and fit a transverse watertight floor in an innerbottom section. Explains keel, longitudinal side girders, floors, fairing, and declivity. Shows how to check the declivity angle, how to use wedges and spur shores, and how to use bar and turn buckles to align the keel. Shows setting, fitting and fairing of a transverse watertight floor.

Laying Off the Boundary, Stiffeners, Water Lines & Buttock Lines. (18 min) 16sd-\$25.22. USOE-Castle. OE30.

Shows how to locate the center line of a ship; how to strike and check water and buttock lines; how to fasten templates with mold loft clamps and dog them down, mark them with soap stone, trim excess metal, and center punch marks to guide the burner. Shows how to locate stiffeners using templates; how to use dogs and wedges in flattening a bulged portion of the bulkhead



Inside of Arc Welding (see Page 77).

to secure a flat fit of a T-bar stiffener; and how to chip a weld to secure a close fit for a stiffener.

Preparing & Setting a Keel Block & Bottom Cradle. (18 min) 16sd-\$25.22. USOE-Castle. OE24.

Explains the basic lines used in ship construction—base line, center line, water line, buttock line, frame lines; defines declivity angle, port and starboard, athwart-ships, and fore and aft; demonstrates the setting of the keel block to the center line and proper declivity angle and the marking off and setting of a spaul from a template mold. Shows the relationship of the keel track and bottom cradle to the ship and the use of the declivity board and spirit level in the construction of the keel track and setting of the keel block.

Side Frames: Sub-Assembly of a Web Frame. (17 min) 16sd-\$24.60. USOE-Castle. OE27.

Explains the role of side frames in holding a ship in shape. Shows how templates are reversed in laying off pairs of frames and the use of web frames to counteract unusual pressure and strain. Shows how to place a template on a steel plate, scribe and punch the lines on the steel plate, locate stiffeners, mark water and buttock lines, and locate and punch mark lightening holes, stringer cutouts, and pipe openings.

Welding, Soldering and Flame Cutting

MOTION PICTURES

Automatic Machine Cutting With the Oxweld Type CM-12 Shape Cutting Machine. (25 min) 16si. Linde.

The operating principles of machine flame-cutting are shown; the automatic cutting machine is used in the production of metal parts.

Brazing Carbide Tools. (18 min) 16sd-\$25.81. USOE-Castle. OE241.

Shows the characteristics of carbide tools, the preparation and brazing of carbide tools with silver solder, making a sandwich braze, and brazing by other methods.

Cutting & Shaping Steel With the Oxweld Cutting Machine Type CM-15. (20 min) 16si. Linde.

Shows uses of the Type CM-15 cutting machine—including preparation of internal dies, rimming dies, gear blanks, large hexagonal nuts,

crane hooks, transformer tops, and gear sections for rocker arms. The CM-15 shown doing straight line cutting, bevel-cutting, circle cutting, cutting from a templet, and hand-tracing. Each operation is carried through from the arrangement of the material to the finish of the cut.

Flame Cutting of Billets & Bars. (16 min) 16si. Linde.

Shows oxy-acetylene cut-off equipment used for cutting round and square bars in end squaring, cutting to shipping lengths, and dividing long sections into forging blanks, techniques and equipment for hot-cutting of billets and for room-temperature billets.

Guided Bend Test, The. (17 min) 16sd-\$24.60. USOE-Castle. OE189.

Shows how to prepare groove weld and fillet weld test specimens for the guided bend test; how to make the test; causes of failure in bending.

Hand Soldering. (20 min) 16sd-\$27.09. USOE-Castle. OE479.

Explains the theory of soldering and shows how to prepare soldering irons and torches; how to clean and prepare the work; how to fasten the joints; how to solder wire and lug joints; how to seal seams.

High Frequency Soldering. (17 min) 16sd-\$24.60. USOE-Castle. OE480.

Shows the theory of high frequency heating; how to select a work coil and leads; how to adjust the work coil to the work; how to tune a converter; how to prepare the workpiece; how to determine and adjust correct soldering time and temperature; and how to use an automatic timer.

How to Weld Aluminum. (35 min) 1942. 16sd. Aluminum in cooperation with USBM.

Shows gas-welding method, using either the oxyhydrogen flame or the oxyacetylene flame; explains proper adjustment of the torch to produce correct shape and color of flame. Shows arc welding, including the metal-arc, carbon-arc, and atomic hydrogen processes.

Inside of Arc Welding. (6 reels-10 min each) 1942. 16sd-color. GE.

Illustrates the technique of arc welding: 1. Fundamentals; 2. Flat Position; 3. Horizontal Position; 4. Alternating Currents; 5. Vertical Position; 6. Overhead Position.

Inside of Atomic-Hydrogen Arc Welding. (20 min) 1943. 16sd. GE.

Part I: Fundamentals of atomic-hydrogen welding; shows regulating the welding current and the hydrogen supply; how to adjust the electrode holder and the tungsten electrodes; how to recognize proper and improper adjustment. Part II: Techniques for making corner, edge and fillet and groove welds; controlling the molten pool; proper penetration; good fusion and uniformity.

Introduction to Oxyacetylene Welding. (20 min) 1942. 16sd. Jam Handy.

Shows methods to get proper flame; holding torch and welding rod; finishing job and putting away tools.

Magic Wand of Industry-Arc Welding. (25 min) 1944. 16sd-color. Lincoln in cooperation with USBM.

A story of arc welding. Describes what the process is, why and where it is used in industry throughout the world.

Manual Cutting a Bevel—Freehand. (13 min) 16sd-\$19.21. USOE-Castle. OE187.

Shows how to select a tip for bevel cutting; how to clean a tip; how to adjust oxygen and acetylene pressure for bevel cutting; how to cut a bevel with minimum drag; and how to handle and operate the cutting equipment safely.

Manual Cutting a Shape—Free Hand Guided. (16 min) 16sd-\$23.35. USOE-Castle. OE188.

Shows how to make a plywood template for cutting; how to make a tip guide device; how to position a template for cutting; how to use the guide device; how to use a circle cutting device.

Manual Cutting to a Line—Free Hand. (21 min) 16sd-\$27.71. USOE-Castle. OE186.

Shows how to assemble an oxyacetylene cutting outfit; how to select the proper cutting tip; how to adjust oxygen and acetylene delivery pressures; how to adjust the preheating cutting flames; how to make a 90 degree free hand cut; and how to disassemble the cutting outfit. Safety measures are emphasized and demonstrated.

Manufacture by Arc Welding. (45 min) 16si. Lincoln.

Shows the use of arc welding in manufacturing processes.

Modern Metalworking With the Oxyacetylene Flame. (30 min) 1937. 16si-loan. Linde in cooperation with USBM.

Part I: Production of oxyacetylene flame; chemical action of water and calcium carbide. Animation shows construction and operation of equipment. Part II: Uses of oxyacetylene welding.

Oxwelding & Cutting. (15 min) 16si. Linde.

Cross section views and animation illustrate principles of oxyacetylene process used in cutting metals and welding; construction and operating principles of oxygen cylinders; acetylene cylinders, oxygen and welding regulators, and blow-pipes for cutting.

Oxwelding & Cutting in Production. (15 min) 16si. Linde.

Presents a brief survey of uses of the oxyacetylene flame welding; pressure vessels, condenser heads, cooler and metal furniture. Hand-cutting applications include removal of gates and risers, and cutting of forging blanks. Machine cutting applications: trimming of blooms, various shape cutting operations on single and stacked plates; multiple flow-pipe-shape-cutting; portable and stationary types of cutting machines.

Oxwelding For Profit. (15 min) 16si. Linde.

The application of oxyacetylene process in industrial fields: the hard-facing of wearing parts; the welding of automobile bodies, and airplane fuselages; installations of welded pipe in buildings; oxyacetylene cutting as a means of demolition.

Oxy-Acetylene Welding in Industrial Production. (15 min) 16si. Linde.

Production applications of oxyacetylene welding; use of jigs shown.

Oxy-Acetylene Welding Light Metal. (21 min) 16sd-\$27.71. USOE-Castle. OE190.

Shows how to assemble a gas welding outfit; how to adjust gas pressures; how to adjust the flame; and how to make a butt weld and T weld in light tubing.

Preheating Welding & Stress Relieving. (15 min) 16si. Electric Arc.

Portrays the relative effects of heating, over heating, quenching and slow cooling as applied to stress relieving in welding of prefabricated parts.

Prevention & Control of Distortion in Arc Welding. (20 min) 1945. 16-d-color. Lincoln.

In any arc welding operation, the heat effect of the arc and molten metal has a tendency to warp or distort the plates being welded. Principles and rules to prevent this are demonstrated. A Walt Disney production under supervision of Lincoln engineers.

Profits of Progress. (10 min) 16sd. Int'l Acet.

Shows the processes of oxyacetylene welding and cutting in general and in repair and maintenance, construction, and repetitive production.

Prosperity Process. (20 min) 16si. Int'l Acet.

Shows oxyacetylene process in metal working industries for reclamation and maintenance. Shows welding and cutting in selected industries.

Story of A-C Welding. (35 min) 1944. 16sd-color-loan. GE.

Shows the speed, flexibility and efficiency of A-C welding process on all types of joints.

Story of Arc Welding. (25 min) 1944. 16sd-color. USBM.

Shows steps in arc welding.

Unionmelt Welding—An Electric Welding Process. (15 min) 16si. Linde.

Animated diagrams shows principles and applications of Unionmelt welding, its mechanical details.

Unionmelt Welding in Industry. (15 min) 16si. Linde.

Shows Unionmelt welding equipment in the fabrication of pressure vessels and pipe, stressing speed, economy and simplicity of process.

Unionmelt Welding in Industry—General Applications. (15 min) 16si. Linde.

Shows process used in construction of transformer tanks, galvanizing kettles, and railroad equipment.

Welding. (11 min) 16sd. U of Ill.

Shows three types of flames, how to secure them, the correct way to hold the torch.

S L I D E F I L M S

Brazing & Silver Soldering. (49 pictures-41 frames) Jam Handy.

Definitions; tools, equipment and materials.

Cluster Welds. (30 pictures-32 frames) Jam Handy.

Special tools; preparations and materials; inspection.

Fillet Welds—Steel. (75 pictures-24 frames) Jam Handy.

Tools, equipment, materials and preparation.

Filmstrips on Electric Welding. (9 films) SVE.

1. Arc Welded Construction; 2. Brief Discussion of the Shielded Arc; 3. The Shielded Arc Process; 4. Greater Profits in Manufacturing by Redesign; 5. Better Builds and Structures at Lower Cost by Electric Welding; 6. Building Better Pipe Lines Faster and at Less Cost; 7. Surfacing by Electric Welding; 8. Automotive Arc Welding by the Electronic Tornado; 9. Safety and Health in Arc Welding.

Flat Butt Welds. (45 pictures-47 frames) Jam Handy.

Preparation; procedures; inspecting weld; tests.

Fuel & Oil Tank Repairs. (29 pictures-32 frames) Jam Handy.

Preparation; cleaning metals; safety; tack welding; testing.

Introduction to Welding, An. (68 pictures-64 frames) Jam Handy.

Oxyhydrogen and oxyacetylene welding; pressure gauges and torches; safety.

Oxyacetylene Cutting. (34 pictures-39 frames) Jam Handy.

Cleaning and preparing the cut; preparing cutting torch; safety.

Qualification Test for Welders. (69 pictures-59 frames) Jam Handy.

Test welds: single V butt, tubular butt, vertical fillet, combination sheet and tube, horizontal fillet; checks and tests.

Setting Up & Lighting the Welding Torch. (58 pictures-65 frames) Jam Handy.

Use of equipment; safety precautions.

Soldering. (92 pictures-71 frames) Jam Handy.

Solder; definition; uses; methods; flux, types and uses; application; the copper; definition; heat sources for soldering; bit, steps in soldering; preparing the bit; soldering cables, terminals, taps and splices; soldering sheet metal; safety precautions.

Structural Steel Workers. \$2. SVE.

Tube Welds—Steel. (71 pictures-58 frames) Jam Handy.

Materials and preparation; specific operations.

Vertical Welds—Steel. (38 pictures-41 frames) Jam Handy.

Vertical fusion welding, lap welding, fillet welding, cross welding; inspecting.

Welding Aluminum Flat Sheets. (64 pictures-69 frames) Jam Handy.

Characteristics of aluminum; uses of flux; making tack welds, butt weld, lap weld, wandering weld.

Welding Aluminum Tubes With Sheets. (49 pictures-32 frames) Jam Handy.

Review of aluminum welding properties; flux; preparation; fillet weld; welding flanges.

Welding Flat Ripples. (31 pictures-35 frames) Jam Handy.

Tools, equipment, and materials needed.

Welding Stainless Steel. (34 pictures-38 frames) Jam Handy.

Tools, materials, and equipment; definition of characteristics.

Welding as an Occupation. \$2. SVE.

Wood & Lumber Industry

PATTERN MAKING

MOTION PICTURES

Designing a Pattern for a Water-Cooled Motor Block. (15 min) 16sd-\$22.58. USOE-Castle. OE337.

How a patternmaker designs a complicated pattern and core boxes; how he can combine study of a drawing with the making of a layout to help in designing; how a complicated design can be broken down into smaller elements for detail study; how production requirements must be considered.

Designing Core Boxes For a Water-Cooled Motor Block. (12 min) 16sd-\$19.00. USOE-Castle. OE338.

How a patternmaker designs complicated core boxes; how a patternmaker can combine study of a drawing with the making of a layout to help in designing; how a complicated design can be broken down into smaller elements for detailed study; how machining and molding requirements must be considered.

Making a Core Box For a Flanged Pipe Elbow. (21 min) 16sd-\$28.38. USOE-Castle. OE330.

Shows how to use pattern layout in making a core box; how to design a core box; how to lay

out a curved core piece; how to turn the core cavity in a curved piece; how to use a reverse template; how to assemble a core box having a curved core piece; how to finish the core box.

Making a Core Box for a Machine Base.
(13 min) 16sd-\$19.65, USOE-Castle, OE331.

How a patternmaker, working from a casting, goes about the job of designing a core box; how to design and construct two core boxes in which mating cores are to be made; how to design and construct large core boxes with loose pieces; how to design and construct a small, half core box with interchangeable loose pieces.

Making a Core Box for a Tail Print. (17 min) 16sd-\$25.81, USOE-Castle, OE350.

Shows how to use dry sand cores in molding holes in castings; how to use pattern layout to make a core box; how to distinguish between core and core print; how to lay out the core print; how to add the core; how to determine parting line of a core box.

Making a Core Box for a Vertical Core. (19 min) 16sd-\$27.81, USOE-Castle, OE329.

Shows how to make sand cores; the function of the sand core; how to make a half box; how to use parted boxes; how to use layout pattern in making a core box; how to prepare core box pieces; how to assemble a core box.

Making a Master Pattern & Core Boxes, & Assembling Cores for a Water-Cooled Motor Block. (15 min) 16sd-\$23.22, USOE-Castle, OE339.

How careful design results in a practical pattern and core boxes; how each step of construction is checked; how a final check can be made with test cores and a sample casting; how these cores are pasted up and assembled.

Making a Match Board Pattern. (20 min) 16sd-\$28.38, USOE-Castle, OE328.

Shows how to sketch a matchboard; how to prepare the board; how to make the patterns; how to make a matchboard layout; how to prepare gates to connect patterns; how to prepare the runner for the cope side; how to assemble the matchboard; how to turn a draft taper on a hole; how to attach flask fixtures.

Making a One-Piece Flat Pattern. (21 min) 16sd-\$29.02, USOE-Castle, OE321.

Shows how to identify the parts of the molding flask; how to use shrinkage rules; how to prepare a pattern layout; how to prepare the pieces that make up a pattern; how to make identical castings; how to finish patterns.

Making a Pattern for a Flanged Pipe Elbow. (18 min) 16sd-\$25.81, USOE-Castle, OE327.

Shows how to make a right angle layout; how

to make a 90 degree, horizontally parted round body; how to turn out separate core prints; how to make split flanges; how to set flanges into core prints; how to assemble half the pattern on the layout; how to dowel an elbow pattern; how to apply fillets.

Making a Pattern for a Machine Molded Steel Globe & Angle Valve. (13 min) 16sd-\$21.95, USOE-Castle, OE310.

Shows how machine molding affects pattern design; how this particular pattern is designed, constructed, and mounted on inserts; how casting in steel affects pattern design; how the gating system for this particular pattern is designed and built for casting in steel.

Making a Pattern for a Three-Part Mold. (20 min) 16sd-\$27.71, USOE-Castle, OE326.

Explains the reasons for the three part pattern; shows how to make the layout; how to segment the body or center section; how to eliminate end grain on large flanges; how to turn large work on the end of the lathe.

Making a Pattern Requiring a Cover Core. (11 min) 16sd-\$21.95, USOE-Castle, OE332.

Shows how consideration of the molding and coring problems leads to the choice of a cover core; how a patternmaker designs a pattern (and core boxes), requiring a cover core; how a patternmaker designs a cover print; how a patternmaker constructs this particular pattern and its core boxes.

Making a Pattern Requiring Box Construction. (17 min) 16sd-\$24.52, USOE-Castle, OE333.

Shows how a patternmaker approaches the task of making a pattern from a casting; how a casting is measured to get pattern dimensions; how a pattern to be made of box construction is designed and why box construction is used; how this particular pattern is made by box construction.

Making a Pattern Requiring Segmental Construction. (13 min) 16sd-\$19.65, USOE-Castle, OE335.

Shows how and why segmental construction is a preferred method for some patterns; how a patternmaker designs a pattern requiring segmental construction; how a patternmaker constructs this particular pattern.

Making a Pattern Using a Green & a Dry Sand Core. (14 min) 16sd-\$21.95, USOE-Castle, OE331.

Shows how a green sand core is molded; how a patternmaker determines when to allow for a green sand core; how a patternmaker designs a pattern allowing for a green sand core; and how a patternmaker visualizes and constructs this particular pattern.

Making a Pattern With a Horizontal Core. (14 min) 16sd-\$21.95, USOE-Castle, OE323.

Shows when to use a horizontal core; how to allow for shrinkage in bronze; how to lay out fillets; how to make horizontal core prints; how to true up a parting plane; how to dowel a pattern with a horizontal core; how to turn crusher strips.

Making a Pattern With a Tail Print. (19 min) 16sd-\$27.10, USOE-Castle, OE321.

Shows how to mold castings with holes; how to make a rough sketch for visualizing the actual casting; how to use dry sand cores; how to form core cavities by using tail prints; how to make a layout including tail prints.

Making a Pattern With a Vertical Core. (15 min) 16sd-\$21.95, USOE-Castle, OE322.

Explains the importance of making a prelim-



Making a Pattern for a Flanged Pipe Elbow

inary sketch; shows how to make the layout; how to allow for shrinkage; how to allow for finish; how to lay out the core prints; how to use the layout; how to assemble the pattern; how to allow for draft; how to shellac the pattern.

Making a Segmented Pattern. (22 min) 16sd-\$29.02. USOE-Castle. OE325.

Shows how to plan segmentation of pattern; how to lay out segments and web; how to assemble the pattern; how to prepare a recessed hub; how to finish the pattern.

Redesigning a Pattern for Production Purposes. (11 min) 16sd-\$17.71. USOE-Castle. OE336.

Shows how this pattern, as originally designed, is molded and why it is not practical for quantity production; how the pattern can be redesigned to meet quantity production requirements.

S L I D E F I L M S

Pattern Making. \$2. SVE.

WOOD FINISHING

MOTION PICTURES

American Walnut. (22 min) 16sd-color. American Walnut.

The manufacture of solid and veneer construction; the making of plywood, and how figured paneled surfaces are produced.

Furniture Craftsmen. (11 min) 16sd-\$50. EBFilms.

Story of custom built furniture; roles of designer and skilled craftsmen described. Processes included: pattern making, laying out, band sawing, power planing, joining, lathe turning, grooving, gluing, carving, finishing of furniture.

Furniture Making. (15 min) 1929. 16si. EBFilms.

Furniture making from beginning to end; drafting; models, hand carving; machine production; multiple carving machine, spindle carver, the jig, sander, belt sander, automatic lathe, automatic turning sander, air router, saws; finishing and assembling, painting and upholstering.

How to Finish Plywood. (22 min) 1942. 16sd-color. Douglas Fir.

Finishing of plywood; painting, staining, enameling, to create proper exterior and interior finishes.

Masterpieces of Mahogany. (30 min) 16si-loan. Mahogany.

From the beginning as a piece of rough solid mahogany lumber through the design and scaled shop drawings, a table is produced as the camera follows the step by step process: the dry kiln, the saws; the turning lathes, the carving, and sanding machines, the finishing steps—staining, filling, glazing, finishing coats, sanding, waxing, and polishing.

Miracle in Wood. (35 min) 16sd-color. Douglas Fir.

The making of plywood; the giant peeler logs; blocks peeled into veneer and veneer into plywood.

Plywood Fleet. (34 min) 1942. 16sd-color. Douglas Fir.

Building small boats: sail boats, power boats, speed boats, and racing shells.

Plywood, the Miracle Wood. (35 min) 1942. 16sd-color. Douglas Fir.

Uses of the material in industry with story of its manufacture.

Prefabrication with Plywood. (35 min) 1942. 16sd-color. Douglas Fir.

Shows factory prefabrication with a survey of the prefabrication industry.

Redwood Saga. (14 min) 16si. Haselton.

Redwood lumber industry of northern California, the cutting, loading, transportation, mill sawing and finishing operations.

Romance of Mahogany. (45 min) 1937. 16si. Mahogany.

The making of mahogany lumber and veneers from the felling of trees in the tropical jungles to the factory.

Trees & Homes. (33 min) 16sd-color. Weyerhaeuser.

The Weyerhaeuser plant in Washington shown in logging and mill operations.

WOOD WORKING

MOTION PICTURES

Beveling, Mitering, Rabbeting, & Dadoing. (19 min) 16sd-\$26.46. USOE-Castle. OE307.

Shows how to cut a bevel with tilted fence; how to cut a bevel with tilted blade; how to set a miter gage; how to use a stopblock in mitering; how to set the fence and blade for cutting rabbets; how to install and use a dado head.

Beveling Stop Chamfering, & Tapering Square Stock. (20 min) 16sd-\$27.09. USOE-Castle. OE303.

Shows how to set fence for bevel cutting; how to adjust the proper amount of cut; how to cut chamfer; how to set the infeed and outfeed tables for stop chamfer; how to set stop blocks; how to cut tapers; how to observe all proper safety precautions.

Chisels. (12 min) 1943. 16sd-\$10.78. Plomb.

Use and care of chisels.

Cutting Cove Molding & Corebox. (19 min) 16sd-\$26.46. USOE-Castle. OE311.

Shows how to select stock for cove molding; how to mark the stock; how to cut and rip cove molding; how to set up equipment and make progressive adjustments in oblique cutting; how to select the proper blade for oblique cutting; how to cut a deep hollow.

Cutting Grooves With Circular Saw Blades. (22 min) 16sd-\$29.02. USOE-Castle. OE320.

Shows how to set up the machine to cut grooves; how to cut grooves in stiles and rails; how to cut grooves for splines; how to cut stop channels in mirror frame members.

Cutting Tenons & Segments. (15 min) 16sd-\$22.58. USOE-Castle. OE308.

Shows how to lay out and cut a tenon; how to set up the equipment to make shoulder cuts; how to set up the equipment to make first and second cheek cuts; how to prepare a jig to trim and miter segments.

Essentials of Wood Turning. (15 min) 16si-\$24; rent-\$1. (10 min) 16sd-\$36; rent-\$1.50. B & H

Shows the operation of the simple wood lathe; the scraping method; and usefulness of wood-working machinery.

Face Planing Uneven Surfaces. (13 min) 16sd-\$19.21. USOE-Castle. OE304.

Shows how to surface wide stock on one side; how to use a pusher; how to make and use a feather board; how to use a backing block for facing thin stock.

Face Turning a Collar. (16 min) 16sd-\$23.35. USOE-Castle. OE317.

Shows how to prepare a faceplate chuck; how to attach work to faceplate chuck; how to turn a fillet; how to taper turn a recess.

Hammers. (11 min) 1943. 16sd. Plomb.

Shows types of hammers and correct ways of handling them.

Hand Sawing. (20 min) 1943. 16sd. Jam Handy.

Shows fundamentals of handling hand saws; methods of choosing right saw for the job. Coping saw uses demonstrated.

Jointing an Edge for Gluing — Installing Knives. (21 min) 16sd-\$27.71. USOE-Castle. OE305.

Shows how to determine when knives are dull; how to remove dull knives; how to install sharp knives on the cutter head and adjust them for proper cutting; how to straighten crooked stock; and how to joint edges for gluing.

Jointing Edges & End Grain 90 Degrees to a Face. (17 min) 16sd-\$24.60. USOE-Castle. OE302.

Shows how to set the fence and infeed table to proper height; how to feed with the grain; how to joint end grain so as to prevent tearing; and how to observe all necessary safety precautions.

Planing Rough Surfaces to Dimensions. (17 min) 16sd-\$24.60. USOE-Castle. OE301.

Shows how to adjust the table for desired thickness; how to set feed rolls for proper speed; how to feed with the grain; and how to surface short pieces and glued stock.

Rabbeting & Shaping an Edge on Straight Stock. (18 min) 16sd-\$25.81. USOE-Castle. OE318.

Shows the principles of shaper operation; how to set up the machine for cutting rabbets; how to cut rabbets; how to set up the machine to shape molding; how to shape a molding.

Ripping & Cross-Cutting. (19 min) 16sd-\$26.46. USOE-Castle. OE306.

Shows how each working part of the variety saw functions; how to check saw blades; how to set the fence; how to protect one's self on the job; how to change saw blades; how to use a cutoff gage; how to use a hinged block in cross-cutting.

Sanding Flat & Irregular Surfaces. (18 min) 16sd-\$26.46. USOE-Castle. OE312.

Shows how the belt sander operates; how to prepare a sanding belt; how to sand flat stock on a belt sander; how to sand curved molding on a belt sander; how to use and replace sandpaper on a spindle sander.

Sawing a Reverse Curve & a Bevel Reverse Curve. (18 min) 16sd-\$25.81. USOE-Castle. OE310.

Shows how to select and lay out stock to avoid waste; how to reverse curves to contour lines; how to use the table tilting gage; how to saw a beveled, reverse curve; how to prepare a template for a newel post; how to saw a newel post having reverse curves.

Sawing With Jig & Changing Band. (20 min) 16sd-\$27.74. USOE-Castle. OE309.

Shows how to select the proper band saw



Face Turning a Collar (see Col. 1, Page 81).

blades for the job; how to change blades; how to fold blades for storage; how to adjust saw guides; how to mark stock and cut to the mark; how to prepare a jig; how to cut discs using a jig.

Shaping After Template & Shaping Curved Edges. (17 min) 16sd-\$25.17. USOE-Castle. OE319.

Shows how to make a template for a job; how to install knives in the spindle; how to use the template when smoothing squared edges; how to set up equipment for shaping a curved edge; how to shape a curved edge in more than one cut.

Turning a Cylinder Between Centers. (17 min) 16sd-\$24.60. USOE-Castle. OE313.

Shows how to choose and center stock for a job; how to mount stock in the wood lathe for turning between centers; how to select the proper speed; how to select and use cutting tools; how to use the parting tool to establish diameter and length; how to use the skew chisel; how to sand turning work; the safety factors involved.

Turning Taper Work. (12 min) 16sd-\$18.59. USOE-Castle. OE314.

Shows how to center cylindrical wood stock for spindle turning; how to make clearance cuts and why they are made; how to establish the diameters of a taper; how to turn a single taper; how to establish diameters for turning two tapers from a single piece of material; how to turn tapers.

Turning Work in a Chuck. (15 min) 16sd-\$22.11. USOE-Castle. OE316.

Shows how to mount work on a face plate; how to turn one face of the work; how to make a chuck for the opposite face; how to fit the finished face to the chuck; how to turn the second face.

Turning Work on a Face Plate. (15 min) 16sd-\$22.73. USOE-Castle. OE315.

Shows the various types of faceplates; how to choose the proper faceplate; how to attach the stock to the faceplate; how to true up the work; how to scribe the work for inside turning; how to use the roundnose chisel and diamond point chisel; how to smooth the bottom of the recess.

S L I D E F I L M S

Cabinet Making. \$2. SVE.

Carpentry. \$2. SVE.

Films of Other Industries

BELLOWS

MOTION PICTURES

Story of Metal Bellows, The. (30 min) 16si. Fulton.

The story of a little known but vital part of many products, from refrigerators to battleships; how they work and how they are made.

BRUSHES

MOTION PICTURES

From Bristles to Brushes. (30 min) 16sd. Fuller; Castle.

Sources of bristles, hair, wire, fibre and cotton are covered, as well as their careful processing after arrival and their utilization in most intricate operations.

BUILDING TRADES

(See also *Insulation Industry*, p. 84;
Wood Working, p. 80)

MOTION PICTURES

Doorway to Happiness. (30 min) 1942. 16sd-color. Fir Door Inst.

Logging; manufacture of doors and millwork; use and care in the homes.

Home Builders at Work. (45 min) 1936. 16si-\$32.50. Purinton.

The building of a home, from plans and blueprints to its occupation, with a depiction of the various trades involved in its construction.

How to Build a House in 78 Minutes. (30 min) 1943. 16sd. Homasote.

Technical review of the fabrication and erection of 5000 Homasote homes in 5 months time, showing the precision-built system of construction.

Making of American Homes. (20 min) 1943. 16sd-color. Castle.

How the kitchen and bathroom may be rebuilt and modernized into rooms of beauty and utility; manufacturing processes in the making of porcelain fixtures.

Mountains of Marble. (22 min) 16sd. Vermont Marble.

Depicts the marble industry in its entirety from the quarrying operation, through the various phases of fabrication to the distribution of the finished product.

Roofs. (35 min) 1941. 16sd-color. Rubberoid.

History of the invention of asphalt, ready-to-lay roofing by the Rubberoid Company in 1892. Process of manufacturing asphalt shingles and roofings, demonstrations of asphalt roofing products.

SLIDE FILMS

Building Trades, Careers in. \$2. SVE.

Marble, Vermont. \$2. SVE.

CEMENT INDUSTRY

MOTION PICTURES

Construction That Endures. (15 min) 16si. USBM.

Shows cement construction: strength, durability, versatility. Shows uses in highways, buildings, canals, pools, bridges.

From Mountain to Cement Sack. (15 min) 16 & 35si. Portland Cement in cooperation with USBM.

Shows processes in the manufacture of cement.

SLIDE FILMS

Cement Finisher. \$2. SVE.

Occupations in Cement Manufacturing. \$2.25. Voca Guidance-SVE.

COAL INDUSTRY

MOTION PICTURES

Black Sunlight. (13 min) 16si. Bray.

Geologic formation of coal, layer upon layer, folding and faulting, hardening into anthracite. Mining methods, stripping, deep shafts, tunnels. Shoring, gas inspection, waste, sizing, washing, shipping.

Coal. (12 min) 16si. rent-\$1.25. B & H.

Formation of coal through the ages, deposit areas in U.S.A., methods of mining.

Dangerous Dusts. (1 reel) 16sd. USDA.

Shows the results of dust explosions and statistics regarding magnitude of them; experimental dust chambers; explanation of mechanisms; pictures of experimental explosions; necessity for cleanliness; dust collecting systems which provide protection.

Making Coal Gas & Coke. (10 min) 16si. Bray.

The operation of a gas plant tells the story of coke and coal gas.

Modern Coal Mining. (25 min) 16 & 35si-sd. Goodyear.

Labor saving machinery, electrically driven, has replaced the coal mining methods used for hundreds of years.



Origin, Mining and Preparation of Pennsylvania Anthracite. (20 min) 16si. Anthracite.

Anthracite coal from origin to consumption.

Peat & Coal. (12 min) 1939. 16sd-\$30; rent-\$150. Edit PS.

Mining and use of peat; explanation of formation of coal.

Plant Food From Coal. (39 min) 1940. 16sd-color. By-Product Ammonia Co.

Story of nitrogen in coal to the modern by-product coking plant which recovers nitrogen as sulphate ammonia.

Power Behind the Nation. (38 min) 1940. 16sd-color. Norfolk RR.

Mining procedure in the Appalachian field is shown. The transportation of bituminous coal and the work of the coaling terminal at Norfolk is covered.

Story of Anthracite. (18 min) 16sd. Anthracite.

The mining and preparation of anthracite coal.

Story of Coal. (10 min) 16sd. Knowledge Builders.

Formation of coal as geologic process; peat, lignite, bitumin, anthracite. Location of coal in U.S.A. Mining with hand tools, and machines. Grading and washing. Future of coal.

"Wildwood" A 100 Percent Mechanized Mine. (45 min) 1930. 16si-loan. Westinghouse in cooperation with USBM.

Film covers testing for explosive gases, rock-dusting to prevent explosion of coal dust. Shows the modern methods of securing coal.

S L I D E F I L M S

Coal Mining. \$2. SVE.

Coal Mining in Pennsylvania, History of. \$2. University Museum-SVE.

GENERAL INDUSTRY

S L I D E F I L M S

Apprenticeships in Industry. \$2. SVE.

Manufacturing Development in Pennsylvania. \$2. University Museum-SVE.

INSULATION INDUSTRY

MOTION PICTURES

Asbestos. (30 min) 1938. 16si-free loan from sponsor or from USBM. Johns-M.

Asbestos-bearing rock is blasted, cobbled for best fibres, fibres are crushed for shipment to factory where articles are made.

Celite, The Story of the Diatom. (10 min) 16sd. Johns-M.

Through a powerful microscope are recorded the actions of living diatoms. Huge deposits of diatomaceous earth at Lompac, California, where Johns-Manville mines the earth or celite.

Sidelights on Siding. (30 min) 1940. 16sd-color. Rubberoid.

Process of manufacturing asbestos cement siding, beginning with asbestos fibre and ending with a demonstration of applying siding to house.

TRAINING FILMS

PAINTING

S L I D E F I L M S

Care & Cleaning of Spray Equipment. Navy-Castle. SN194.

Describes parts, nomenclature and maintenance of dope and paint spray equipment.

Spray-Painting Equipment. (73 pictures-61 frames.) Jam Handy.

Typical outfit; how it works; types aircaps; internal mix, external mix, and suction; gun construction and use; cups; suction feed, gravity feed, and pressure feed; tanks; agitators; air and fluid hoses; types and construction, transformers and condensers; cutaway sections of all principal parts.

PAPER INDUSTRY

MOTION PICTURES

Paper Making. (20 min) 16sd. Coronet.

Shows in complete detail the process involved in converting trees from the forests of the United States and Canada into paper. The action of the digester and bleacher are explained in animated diagrams. The operation of the large paper machines as well as the calendering machine and testing of the paper in research laboratories are shown.

Short Course in Paper Making. (30 min) 16sd-loan. Glatfelter.

Shows the complete manufacture of fine papers in a modern mill. Begins with the cutting of the trees from which the wood pulp is obtained and continues through each subsequent process. Such indirect processes as power and steam production, water filtration, laboratory testing and control, and reclaiming of unused material are also presented.

Trees to Tribunes. (30 min) 1943. 16sd. Chicago Tribune.

Various steps required to produce a metropolitan newspaper, from logging to delivery of paper.

S L I D E F I L M S

Paper in the Making. \$2. SVE.

RAILROAD INDUSTRY

MOTION PICTURES

Correction of Boiler Foaming, The. (30 min) 16. Electro-Chemical Eng.

Results of standing rests; conditions inside of boiler while the locomotive is in actual road service; and the results of laboratory work in connection with the boiler water studies.

Diesels Working on the Railroads. (12 min) 16sd. GM.

Manufacture and application of diesel-electric locomotives, and resulting revolution of the railroad industry.

Freight Train. (10 min) 16sd. B & H.

Complete story of handling of freight, operation of train, various types of employees involved and their duties.

Freight Yard. (20 min) 1942. 16sd. NY Central.

Tells of operations in freight yards, classification, inspection, rolling over the hump, car repair and servicing locomotives.

Great Railroad at Work, A. (40 min) 16sd. New York.

What and who makes a railroad operate.

It's Easy When It's Alkaline. (12 min) 16sd-free. Edison.

Servicing and shopping of railroad car lighting and air-conditioning batteries; methods of overhauling batteries and placing in cars.

Locomotive Superheater. (60 min) 16si-free. Superheater.

Development, principle and maintenance of superheater actual operation of the unit shown by animated diagrams.

Miracle of a Locomotive, The. (16. Canadian Pacific.

Construction of a passenger engine at the Canadian Pacific Angus Shops, Montreal.

Modern Coal Burning Locomotive. (25 min) 1944. 16sd-color. Norfolk RR.

Shows construction of coal burning locomotive from beginning as rough steel as it proceeds through the foundry of the Norfolk and Western Railway at Roanoke, Virginia. Shows the operation of the passenger engine—the streamlined variety—and a combination passenger and freight engine.

Operation of a Steam Locomotive. (15 min) 16si-loan. Santa Fe.

The principle of operating locomotives with steam is shown by animation.

Protected Power for Passenger Comfort. (12 min) 16sd-free. Edison.

Story of passenger car lighting and air-conditioning; use of steel alkaline batteries as a means of reducing servicings.

Railroad Transportation. (30 min) 16si-free. Westinghouse.

Early forms of transportation, early railroads; locomotive construction; electrification of railroads and types of electric locomotives.

Steam Locomotive. (22 min) 1944. 16sd-loan. NY Central.

Shows construction, operation, maintenance, and capabilities of the Hudson type locomotive; mechanisms included are automatic stoker, air brakes, and water scoop. Animation shows steam moving the engine, illustrating the principle of steam production.

Tale of the Iron Horse. (8 min) 16si. Bray.

Evolution of the modern locomotive from the primitive little wood-burning locomotives of 1832.

RUBBER INDUSTRY

MOTION PICTURES

Freedom Rides on Rubber. (30 min) 1944. 16sd-loan. Firestone.

Depicts the history, development, and the final making of synthetic rubber.



A Scene from "Heat and Its Control."

Materials of War. (40 min) 1944. 16sd. U S Rubber.

Most important operations in manufacture of various rubber items for war.

Rubber Reborn. (10 min) 16sd. Midwest Rubber.

Shows step by step the manufacture of reclaimed rubber from raw material to finished product.

Story of Neoprene, The. (20 min) 1940. 16sd-free. Dupont.

Shows the story of neoprene and the use of this product to replace natural rubber.

Story of Synthetic Rubber. (28 min) 1944. 16sd. USBM.

Shows the processes in the manufacture of synthetic rubber.

Story of the Tire. (30 min) 16sd-transportation one way. Goodyear.

Manufacturing operations of automobile tires from beginnings on the rubber and cotton plantations.

Synthetic Rubber. (21 min) 1944. 16sd-loan. Goodyear.

Step-by-step processes in the making of chemicals into rubber. Covers the history of the development of synthetic rubber.

S L I D E F I L M S

Rubber Industry, The. \$2. SVE.

TEXTILE & CLOTHING INDUSTRIES

MOTION PICTURES

Cotton, Civilization's Fabric. (30 min) 16si. Fruit of the Loom Mills.

Cotton picking, ginning, and baling. Sorting and preparing for spinning. How the cotton is spun into fine threads, spooled, warped, woven, inspected, bleached, and washed.

Facts About Fabrics. (26 min) 1941. 16sd-loan. Dupont Rayon.

Shows yarns, their construction, dyeing operations and manufacture into textiles.

Fashion's Favorite. (33 min) 1940. 16sd. Dupont Rayon.

Manufacture of cellulose acetate and of viscose rayon as done by Dupont; laboratory test of products.

King Cotton. (19 min) 1940. 16sd-sale. GM; Jam Handy.

Shows improvements in the growing and ginning of cottons, how the finished product is used—including the manufacture of lacquer, upholstery, plies for tires, plastics and textiles.

Leather Tooling. (20 min) 1945. 16sd-\$54; rent-\$3. Gutlohn.

Tooling and carving of such articles as bags, belts and purses.

Magic of Shoe Making. (30 min) 16si. Gallen Kamp.

Latest machine processes from cutting to finishing.

Men's Clothing Industry. (2 reels, 30 min) 1935. 16si. Howard; Films of Commerce.

Training high school students in needle trades; work performed by various types of operators in the making of men's clothing in a factory; merchandising of clothing.

Modern Rug & Carpet Making. (15 min) 1941. 16sd-partly color-free. Films of Commerce.

Depicts the manufacture of Alexander Smith rugs and carpets in a large modern mill. Different kinds of weaves are geographically shown.

Rayon. (35 min) 1941. 16sd. American Viscose.

Processes in the rayon industry.

Rayon, A New Frontier of Progress. (20 min) 16sd. Viscose.

Raw materials and steps involved in manufacture of spun rayon yarn, acetate yarn, and mignon yarn. Uses of the different kinds of rayon yarn.

Story of Leather. (25 min) 16-35si. (15 min) 16sd. Tanners.

The processes involved in the manufacture of leather from the round-up of cattle on the plains to the finished product.

Threads of a Nation. (11 min) 16sd-color. Columbia Pictures.

Cotton from fields to finished fabric.

Woolen Yarn, A. (15 min) 16-35si. GE.

History of the woolen industry, portraying the crude methods of early times, and the efficiency of modern electrically operated mills. The whole process is authentically portrayed, from the clipping of sheep through carding and washing the wool, drawing and combing it all by electricity. In contrast with early methods, modern spinning, winding and weaving operations are shown.

S L I D E F I L M S

Leather, A Trip Through a Modern Plant. \$2. SVE.

Rayon, The Story of. \$2. SVE.

THERMODYNAMICS

S L I D E F I L M S

Distributing Heat Energy. (11 min) 16sd. EBFilms.

Location photography reveals the nature of heat sources—coal, gas, electricity, oil, and wood. Animation describes the operation of hot air, hot water, and steam heating plants using coal, gas, and oil as fuels. The principles of conduction and convection likewise are illustrated. Methods and materials of insulation for houses and containers are explained and demonstrated.

Energy & Its Transformations. (10 min) 1933. 16sd-\$50. EBFilms.

Representations of potential, kinetic and radiant energy, as manifested in mechanical, electrical, chemical, and thermal forms are explained and illustrated by such devices as the pile driver, the water turbine, and a dynamite explosion. The law of conservation of energy is shown. Representations of atomic energy are shown.

Energy in Work. (15 min) 16si. DeVry.

Shows the working of a steam operated electric power plant.

Fuels & Heat. (11 min) 1938. 16sd-\$50. EBFilms.

Animation shows the manufacture and storage of carbohydrates by plants; the role of carbon in the burning of fuels; the formation of coal and petroleum; the process of combustion; molecular action in relation to heat and temperature; and the operation of the steam and gasoline engines. Natural photography supplements the animated interpretations with examples from everyday applications.

Heat & Its Control. (45 min) 16sd. Johns-M.

Shows how heat can be used to do work if it is controlled properly. The uses of various types of insulation material, especially asbestos, are described.

Story of Rock Wool Home Insulation, The. (25 min) 1942. 16sd. Johns-M in cooperation with USBM.

Shows the cause of draft and loss of heat due to lack of insulation.

Thermodynamics. (11 min) 1938. 16sd-\$50. EBFilms.

Deals with an interpretation of selected heat phenomena. Animation depicts molecular action in heated iron with relation to temperature. The chemistry of combustion is illustrated graphically. Transformations of energy in the steam engine, the steam turbine, gasoline engine, and Diesel engine are explained. The first and second laws of thermodynamics are portrayed. Location photography associates the application of concepts involved to problems of modern industry.

S L I D E F I L M S

Fire & Heat. \$2. Vis Sci-SVE.

Physics.

Heat. (28 slides) AMNH.

Causes of heat; sources of heat; determining temperatures; modes of transferring heat from one place to another; expansion of heat; latent heat; electric heat.

Supplementary Training Films

AVIATION INDUSTRY

MOTION PICTURES

Air Currents & Theory of Streamlining. (10 min) 1937. 16sd-\$27; rent-\$1.50. Cutlohn.

How air currents in smoke chamber react to different shaped objects; what keeps a plane up, and what happens when the angle of incidence becomes too great.

Working on Air. (18 min) 16sd. GM.

Development of a simpler and lighter constant speed propeller, production and use in combat.

SLIDE FILMS

Adjustment of Hydraulic Brakes. (71 pictures-69 frames) Jam Handy.

How to adjust three standard types of airplane brakes—Bendix two-shoe expanding type, Hayes expander-tube type, and Goodyear multiple-disc clutch type; where to check for faulty hydraulic system; fitting leaks; method of bleeding and pumping up Hayes-type system; adjustment and sets of bell cranks; bleeding and filling the Goodyear multiple disc clutch brake; adjusting discs, adding new discs; setting to proper tolerances.

Forces in Flight. (90 pictures-67 frames) Jam Handy.

Definition and functions of fuselage, landing gear, power plant and control surfaces; weight concentration point, or center of gravity and center of pressure; parasite drag; wing friction, turbulence drag, interference drag; factors of thrust; glides; climbing; location of center of pressure relative to center of gravity; flight characteristics caused by different forces; corrections to counteract forces.

Stresses in an Airplane. (65 pictures-64 frames) Jam Handy.

What forces and load on parts of an airplane make up "stress": pulling, compression, bending, shear, torsion; what kinds of material used in airplane construction stand up best under various stresses; why these various kinds of material are used where they are used; how to recognize the proper place to use the right material.

AUTOMOTIVE INDUSTRY

MOTION PICTURES

Get Going! (1 reel) 16sd. Jam Handy.

Shows how a force acts to make things start; how increasing the power or cutting down weight will help the moving force; how sacrifice in weight causes loss in durability and strength; the balance which has been achieved in the modern motorcar between power and weight to deliver the utmost in acceleration without loss of durability or economy.

Short Stops. (1 reel) 16sd. Jam Handy.

The operation of the perfected hydraulic brake; the effect of speed and road surface on stopping distance; how to use the brakes most effectively for smooth and safe stops.

Years of Progress. (32 min) 16sd. Chrysler.

An overview of the origins of the various phases of science which have any bearing on the modern automobile.

SLIDE FILMS

Clutch, The (Part 1). (51 pictures-55 frames) Jam Handy.

Preliminary inspections and adjustments, and overhaul of the conventional clutch for 1934 to 1937, inclusive.

Clutch, The (Part 2). (51 pictures-46 frames) Jam Handy.

Removal, disassembly, inspection, and reassembly of the diaphragm spring clutch for 1938, 1939, 1940 and 1941.

Cooling System, The. (31 pictures-43 frames) Jam Handy.

Cleaning and reverse flushing; reconditioning the system.

Engine, The. (49 pictures-57 frames) Jam Handy.

Main bearing adjustment, piston fitting, piston pin fitting, piston ring fitting, connecting rod alignment, installing pistons, connecting rod bearing adjustment, and oiling system for engines from 1934 to 1941, inclusive.

Engine Tune-up. (32 pictures-57 frames) Jam Handy.

Complete tune-up instructions for all Chevrolet engines from 1934 to 1941, inclusive.

Generator, The. (115 pictures-108 frames) Jam Handy.

General principles, construction, what it does.

Hydraulic Brakes. (68 pictures-131 frames) Jam Handy.

Bleeding the brake system; adjustment; brake shoe replacement; main cylinder overhaul; wheel cylinder overhaul; replacing hose, pipes, connectors, and cables.

Shock Absorbers. (61 pictures-58 frames) Jam Handy.

General service and repair instructions for both single and double acting shock absorbers for 1936, 1937, 1938.

Wheel Alignment (Dubonnet Type Knee-Action). (49 pictures-54 frames) Jam Handy.

Complete front end and wheel alignment instructions for Dubonnet type knee-action units.

Wheel Alignment (1939 Knee-Action). 52 pictures-48 frames) Jam Handy.

Complete front end and wheel alignment instructions for 1939 knee-action units, not Dubonnet type, plus information on 1940 and 1941.

CERAMIC & GLASS INDUSTRIES

MOTION PICTURES

Clay, Hands & Fire. (20 min) 1938. 16sd-rent-\$1.25. Copeland & Thompson, Inc.

Complete story of manufacture of Spode dinnerware.

nerware from digging of the clay to the use of the ware at tea time.

Clay Pottery. (10 min) 1941. 16sd-\$10; rent-\$2. Brandon.

Digging clay from mine; weathering of the clay; compression and working of clay to remove air pockets; shaping, drying, and smoothing; firing and glazing.

Pottery Making. (11 min) 1939. 16sd-\$50. EBFilms.

Mixing clay, shaping, trimming and preparing for firing; ancient method of using coils of clay; molding in a plaster cast; making angular shaped pottery by cementing together slab pieces; methods of decorating and firing; techniques of applying glazing slip by dipping, brushing, spraying and pouring.

CHEMICAL INDUSTRY

MOTION PICTURES

Dr. Langmuir—On Surface Chemistry. (30 min) 1940. 16sd-\$135; rent-\$7.50. Brandon.

Experiments and discussion by Dr. Langmuir on surface chemistry.

Frontiers of the Future. (11 min) 16sd. GM.

Wool made from cheese; gears, jewelry and plastics made from cotton, sour milk, carbolic acid, formaldehyde and air; rubber made from coal, limestone, salt and water; plastics that come from oil well gases; perfume made from coal; gasoline obtained from sea sand.

Metal Crystals. (11 min) 1944. 16si. Am Soc for Metals.

Common shapes of crystal formation; microscopic technique; temperature solidification.

ELECTRONIC INDUSTRY

MOTION PICTURES

Magic in the Air. (9 min) 16sd. GM.

A typical stage setting in the television studios at Radio City, New York; the construction and operation of the Iconoscope (transmitting tube) and the Kinescope (receiver); similarity between motion pictures and television illustrated.

Uses, Unlimited. (37 min) 1944. 16sd-color. YMCA.

Explanation of production and operation of micro switches.

SLIDE FILMS

Quick Disconnect for Electrical Circuits. (30 min) sd. Cannon Electric.

Selecting, installing, inspecting and servicing electrical connectors.

Soldering Tips. (30 min) sd. Cannon Electric.

How to solder electrical connectors.

ENGINEERING

MOTION PICTURES

Bailey Bridge. (8 min) 1945. 16sd-\$9; rent-50c. BIS.

The construction and use of a prefabricated bridge made from interchangeable parts.

Bridging a Century. (15 min) 16sd-free. Roebling's Sons.

Spinning the cables for the Golden Gate Bridge; wire rope making.

Bridging Marble Canyon. (10 min) 16sd-free. AISC.

How a steel arch bridge was constructed across Marble Canyon at a point miles from the nearest railroad.

Congruent Figures. (12 min) 1945. 16sd-\$10; rent-\$2. Knowledge.

Geometric principles of "equal sides and equal angles" methods for finding and proving that angles and sides are equal.

Draftsman, The. (11 min) 1942. 16sd-\$50. Voca Guidance.

The graphic language of lines and symbols of the draftsman; the various types of drafting used, from free hand sketches to detailed finished drawings, in the preparation of plans for a building; the various industries requiring draftsmen.

Introduction to Mechanical Drawing. (20 min) 1940. 16si-\$30. Cocking.

Preparation of materials and methods of procedure for making drawings of articles requiring one, two and three views.

Lines & Angles. (12 min) 1945. 16sd-\$10; rent-\$2. Knowledge.

Geometry of straight, right, acute, obtuse, and reflex angles.

Locus. (12 min) 1945. 16sd-\$10; rent-\$2. Knowledge.

Visualization and explanation.

Progress Through Engineering. (12 min) 16sd. GM.

Relationship of modern civilization to the engineering profession; engineering in the fields of transportation, sound transmission, sanitation, refrigeration, home comforts, electricity, and even luxuries.

SLIDE FILMS

Addition & Subtraction. (16 pictures-30 frames) Jam Handy.

The scope of addition and subtraction; decimal points; carry-overs; unit borrowing; anticipation of results; simple computing methods; checks for accuracy.

Addition & Subtraction in Geometry. (51-pictures-56 frames) Jam Handy.

Relating geometry to basic arithmetic; ingenuity vs. memory; fundamentals from which theorems are developed.

Addition & Subtraction of Fractions. (13 pictures-17 frames) Jam Handy.

Making fractions behave; unlike units and like units; common denominators and their usefulness; how mixed numbers act; short cuts; anticipation of results.

Arithmetic of Algebra, The. (40 pictures-46 frames) Jam Handy.

Variable and quantities visualized; applying the fundamental processes; factoring.

Equations & Formulas. (53 pictures-63 frames) Jam Handy.

Simple equations; what they mean and how they're solved; the multiple use of formulas; transposition; a time-saver for formula users.

Exponents & Logarithms. (70 pictures-87 frames) Jam Handy.

The powerful "little numbers"; their convenience; variety; usefulness; powers and roots visualized; their relationship to fractions and factors; speeding up arithmetic and logarithms.

Five Keys to Math. (46 pictures-48 frames) Jam Handy.

Of what importance is mathematics in everyday and in industrial life? How much mathematics does one have to know? What are the methods of learning that will help the student develop ingenuity in applying mathematics?

Fractions, Decimals, & Percentage. (55 pictures-59 frames) Jam Handy.

From whole numbers to fractions to decimals, to percentage and back; when it pays to use a decimal instead of a fraction; when fractions are most practical; importance of selecting the right form; percentage problems the easy way.

Graph Uses. (49 pictures-53 frames) Jam Handy.

How to develop and use graphs in everyday activities. Graphs—in their relationship to formulas and equations; as a device for giving the facts at a glance.

Multiplication & Division. (27 pictures-70 frames) Jam Handy.

A short method of addition and subtraction explained. When multiplication? When division? Working form; contacting the decimal point; anticipation of results; short cuts; checks.

Multiplication & Division in Geometry. (48 pictures-54 frames) Jam Handy.

Completing the application of arithmetic to geometry; areas and volumes; ratios and similarity; the circle.

Multiplication & Division of Fractions. (21 pictures-30 frames) Jam Handy.

Indicated multiplication and division; what really happens when fractions are multiplied or divided; reductions; the way to tame large fractions; short cuts; checks.

Order of Operations. (37 pictures-46 frames) Jam Handy.

Practical uses of the processes studied; operations involving choices of basic methods; development of mental resourcefulness.

Positive & Negative Numbers. (48 pictures-60 frames) Jam Handy.

The "well-known positive" and the "helpful negative" visualized; how they influence each other in the four fundamental operations; the realm of the negative; its contribution to mathematical scope.

Problem Analysis. (37 pictures-45 frames) Jam Handy.

How to "size up" the problem; surveying the information; completing the picture; analyzing the results; preparation pays dividends.

Ratio & Proportion. (40 pictures-50 frames) Jam Handy.

Graphic visualizations of what is meant by ratio and proportion. How these forms help in practical, everyday situations; the Magic Three.

Square Root & Cube Root. (46 pictures-52 frames) Jam Handy.

Applying the reason to the method of rooting; understanding vs. memory, where memory is short-lived.

Trigonometry. (35 pictures-45 frames) Jam Handy.

Extending the scope of geometry; development

of basic relationships; the general triangle.

Vectors. (52 pictures-55 frames) Jam Handy.

A simple means for graphic visualization of the three force properties; concurrent and resultant forces analyzed; navigation simplified by vectors.

ENGINES

MOTION PICTURES

Men Bet Their Lives on It. 16sd. Packard.

The production of precision built engines for aircraft and marine use.

INDUSTRIAL MANAGEMENT

MOTION PICTURES

Giving a Shop Demonstration. (2 reels) 16sd. Jam Handy.

Shows good teaching technique in giving a shop demonstration. Teacher assembles tools and materials in preparation for his class, which will learn how to stretch metal around a bending form to make the sides of a parts tray. Every step covered thoroughly.

SLIDE FILMS

Points on Slidefilms. (75 pictures-90 frames) Jam Handy.

How to use various types of slidefilm projectors; care of the projector; trouble shooting; how to arrange the room for a most effective showing and what preparations to make before the class assembles.

Shop Teaching. (35 pictures-44 frames) With or without a record. Jam Handy.

Formal preparation of shop lessons and how to demonstrate.

Some Principles of Teaching. (46 pictures-56 frames) With or without record—none is required. Jam Handy.

Seven suggestions on how the teacher can help shorten the learning process.

Teaching a Vocation. (49 pictures-52 frames) With or without record. Jam Handy.

Learning through doing and basic safety precautions; the "Carry over."

MACHINE SHOP

MOTION PICTURES

Drilling in Metal, Wood & Plastics. (20 min) 1943. 16sd-\$21.46. USOE-Castle.

Demonstrates and explains the use of several types of drills suitable for drilling in different metals, wood, or plastics.

Machining a Cast Iron Rectangular Block. (25 min) 1942. 16sd-\$32.73. USOE-Castle.

OE20.

The procedures for rough machining and finish machining a rectangular block of metal held in a vise mounted on the table of the machine.

Swaging. (26 min) 16sd. Standard Machinery.

Swaging process of pointing, shaping and attaching fittings to bar, cable and tube. Materials include steels, copper, aluminum and some types of wood products.

S L I D E F I L M S

Machine Technique (Part 1). (85 pictures-35 frames) Jam Handy.

Cutting tools and "tool steels"; tool material requirements; more important types of tool's.

Machine Technique (Part 2). (67 pictures-62 frames) Jam Handy.

Explanation of feed and speed—their importance; how to determine feed and speed; cooling and lubricating fluids.

Machine Tools. (62 pictures-53 frames). Jam Handy.

Definition of a machine tool; five main divisions; general description of the more important machine tools.

Machinist, The. (50 pictures-50 frames) Jam Handy.

A history of machining; the position of the machinist in industry; training required; opportunities.

Power Supply. (87 pictures-120 frames) Jam Handy.

Starting and stopping machines wired separately from each other; machines controlled by a hand-operated master switch; machines using motor controllers and emergency stop stations; machines driven by overhead belts; shifting machine belts; shifting overhead belts.

Shapers. (52 pictures-42 frames) Jam Handy.

The shaper, its basic parts and functions; shaper tools; types of work performed; safety hints.

Tool Grinder. (46 pictures-63 frames) Jam Handy.

Introduction to the tool grinder, kinds of tool grinders, names and functions of parts; safe practices for setting up a tool grinder; safe practices for using a tool grinder.

MATERIALS & METALS

MOTION PICTURES

Hyatt Bearings Division. (18 min) 16sd. GM.

History of the roller bearing; high efficiency of the various types of roller bearings assembled at Hyatt and some of the methods used in producing them.

Making of Alloy Steel. (45 min) 16sd-free. Bethlehem.

Preparation and charging of open hearth furnace; billet preparation; rolling on hand mills; cold drawing; heat treatment; finishing operations—straightening, grinding, rough machining, pickling.

Mining of Sulphur in the Gulf Coast Region. (18 min) 1939. 16sd. Freeport.

Processes used in deep-well mining of sulphur, and economic values.

Recital of Faith. (35 min) 1944. 16sd. Modern.

Story of Reynolds Metals Company in the production of aluminum and magnesium.

This is Steel. (28 min) 16sd-free. Bethlehem.

Production of pig iron in the blast furnaces; refining of iron into steel; shaping of steel.

OFFICE PRACTICE

MOTION PICTURES

Business Machines. (15 min) 16si. Rent-\$2. YMCA.

A description of the purpose and use of various office machines—Executive Model Dictaphone, Telecord, International All-Electric Typewriter, Monroe Social Security, Sunstrand Social Security, Moon Hopkins, Elliott Fisher Fanfold Bills, Comptometer, Burroughs' Cumulative Calculator, Postal Meter, Check Signer, Graphotype, Addressograph, Hollerith Automatic Punch Card Accounting Machine.

Championship Typing. (15 min) 1938. 16si-\$50; rent-\$2. YMCA.

Grace Phelan, world's champion amateur typist in slow motion study of her work; correct position, touch, rhythm. Typing at measured rates of speed. Normal and slow speed demonstrations.

Eight Parts of a Business Letter. (12 min) 1944. 16sd-\$24; rent-\$1.50. Gutlohn.

Heading, introductory address, salutation, body, complimentary close, signature, outside address, return address; preparation for mailing of various types of letters.

5C's of Business Letter Writing. (10 min) 1944. 16sd-\$25; rent-\$1.50. Gutlohn.

Whys and hows of writing good business letters.

How to Operate Mimeograph Duplicator 91. (20 min) 16sd-\$70; rent-\$2.50. Bus Ed.

Preparation of stencils on typewriter or drawing board; operation and care of the mimeograph duplicator; samples of good reproduction.

Taking Dictation & Transcribing. (10 min) 35sd. Gregg.

The taking and writing of a perfect letter, illustrating techniques and procedures used by a successful secretary.

Tricks of the Trade for Typists. (15 min) 1940. 16si. Rent-\$2. YMCA.

Demonstrates methods used by professional typists to speed up production. Particular attention is paid to backfeeding, notching carbons, card flipping, and methods of saving seconds.

OPTICAL & PHOTOGRAPHIC INDUSTRIES

MOTION PICTURES

Alchemist in Hollywood. (33 min) 1940. 16sd-\$60. Solow.

Photographic process explained with the aid of diagrams; explanation made of action of light on silver bromide crystals; different chemicals used in developing and fixing baths; comparison between operations in old time "dark rooms" and modernly equipped laboratories; making a positive print from a negative.

Behind the Camera. (40 min) 1939. 16sd-color. Wolff.

Every phase in the production of an advertising photographic illustration, including the developing processes of black and white prints and carbo and kodachrome color prints.

Common Mistakes & Their Correction. (15 min) 16si-rent-\$1.50. RFA.

Analyzes common mistakes in movie making, illustrating all the probable causes; methods of correction shown in close-ups.

Eastin Film Presents. (16 min) 1940. 16sd. Eastin.

Operations of a film library: handling correspondence, booking the films, preparing them for shipment, inspecting them on return; unnecessary shortcomings and mistakes on the customer's part.

Elements of Photography. (22 min) 1940. 16si-\$42; rent-\$3. Gutlohn.

Taking the picture; development of negative; projection printing; developing, fixing, and washing prints.

Exposure & Exposure Meters. (15 min) 16si-rent-\$1.50. RFA.

Examples and suggestions for obtaining properly exposed pictures.

Film Editing. (15 min) 16si-rent-\$1.50. RFA. Suggestions for good editing.

Good Photography is Flash Photography. (25 min) 1944. 16sd. GE.

Shutter action, in slow motion; synchronizer; and flash bulb characteristics.

How Motion Pictures Move & Talk. (11 min) 1939. 16sd-\$38; rent-\$1. B & H.

Mechanical, electrical, and visual principles behind modern talking moving films: persistence of vision, the variety of machines involved, recording and reproduction of sound.

How to Use Filters. (15 min) 16si-rent-\$1.50. RFA.

Theory of filters, and filter factors: various types of filters—colored, diffusing, and polarizing; comparison of results with each type; care in handling filters.

How to Use Your Camera. (15 min) 16si-rent-\$1.50. RFA.

Reasons for doing and for avoiding doing certain things in cinematography.

How You See It. (10 min) 1941. 16sd-\$36.50. Jam Handy.

Persistence of vision and relation to motion pictures; how the eye works; construction of the motion picture projector, and the optical reasons for shutter, lens, and sprockets.

Lenses & Their Uses. (15 min) 16si-rent-\$1.50. RFA.

Theory of lenses; types and uses of lenses; handling and using lenses.

Let Us See. (20 min) 16sd. 1945. Illuminating Eng Soc.

How the eye reacts to light; demonstrates the four fundamentals of good lighting design under actual manufacturing conditions. Principles applied to case histories, illustrating light-measuring techniques.

Modern Photo Engraving. (38 min) 1945. 16sd. Eastman Kodak.

The production of four-color process plates from the art room to the press room.

Photography. (10 min) 1937. 16sd-\$27; rent-\$1.50. Gutlohn.

Art of photography on land, sea and in the air; unusual effects of under-exposure, trick photography, and weird angles.

To Greater Vision. (28 min) 1944. 16sd. Bausch & Lomb.

Manufacture of glass for optical instruments and eyewear; demonstration of optical principles involved—reflection, refraction, dispersion, focus; manufacture of prisms, lenses, and other optical elements.

Use & Care of the Filmo Sound Projector. (20 min) 1943. 16sd-\$50; rent-\$1. B & H.

Demonstration of set-up, threading, operation, and replacement of consumable items on 16mm sound projector.

PETROLEUM INDUSTRY

MOTION PICTURES

Marvel of Gasoline Chemistry. (13 min) 1941. 16sd. Sun Oil.

The refining of Nu-Blue motor fuel: the catalytic process.

Oil for Tomorrow. (30 min) 1944. 16sd. Interstate Oil.

Story of oil from prehistoric origin to ultimate utilization by modern civilization.

Petroleum & Its Products. (12 min) 1939. 16sd-\$30; rent-\$1.50. Edit PS.

Geological forces causing formation of oil deposits, bringing in an oil well, refining the petroleum.

PHYSICS

MOTION PICTURES

Compressed Air. (15 min) 16si. Eastman Kodak.

Principles underlying the compression of air, and its application to air brakes, air-driven tools, etc.

PLASTICS INDUSTRY

MOTION PICTURES

Plastics. (16 min) 1944. 16sd-\$50; rent-\$5. Young America.

Story of plastics.

SHIPBUILDING INDUSTRY

MOTION PICTURES

Shipways. (40 min) 16sd-free. Bethlehem.

Advances in art of shipbuilding from days of clipper ships; the building of a victory ship, from drawing board to trial run; repairing and reconditioning certain types of vessels.

WELDING

MOTION PICTURES

New Horizons in Welding. (30 min) 16sd-free. Harnischfeger.

The modern set-up for production welding—the testing laboratories, the preparation of templates, and the actual welding processes.

Welding Operator. (11 min) 1942. 16sd-\$50. Voca Guidance.

Use of oxyacetylene equipment; resistance welding; arc welding; typical jobs.

SLIDE FILMS

Fire Prevention & Other Precautions in Welding & Cutting. Linde.

Safety techniques in the use of oxyacetylene welding and cutting processes.

Safe Handling of Oxygen & Acetylene Cylinders & Apparatus. Linde.

Safety techniques in the use of oxy-acetylene welding and cutting processes.

WOOD & LUMBER INDUSTRY

MOTION PICTURES

Douglas Fir Plywood. (30 min) 16sd-color. Denver.

Logging operations and details of making plywood by both the cold and the hot press methods; uses of plywood.

Forest Treasures. (25 min) 16sd-free. Veneer.

Sources of the rare woods; history of plywood; production of veneer and plywood; craftsmen at work; masterpieces from veneers.

Treasures of the Forest. (15 min) 1914. 16sd-\$16. USDA-Castle.

Cutting and transportation of logs to mills; cutting logs into lumber and pulpwood; manufacture of wood pulp, paper, and viscose, and viscose into rayon.

Woodworker. (11 min) 1940. 16sd-\$50. Voca Guidance.

Carpentering, mill working, cabinet making, pattern making phases of woodworking industry.

SLIDE FILMS

Band Saw. (79 pictures-89 frames) Jam Handy.

Introduction to the band saw; names and functions of parts; safe practices for setting up a band saw; safe practices for band sawing.

Belt Sander. (62 pictures-84 frames) Jam Handy.

Introduction to the belt sander, names and functions of parts; changing a sander for horizontal operation; safe practices for setting up a belt sander, replacing an abrasive belt; safe practices for belt sanding.

Circular Saw: Parts—Installing a Blade. (74 pictures-76 frames) Jam Handy.

Introduction to the circular saw; kinds of circular saws; names and functions of parts; kinds of blades; installing a blade.

Circular Saw: Setting Up—Operating. (40 pictures-64 frames) Jam Handy.

Safe practices for setting up a circular saw; safe practices for using a circular saw.

Disk Sander. (31 pictures-48 frames) Jam Handy.

Introduction to the disk sander; kinds of disk sanders; names and functions of parts; safe practices for setting up a disk sander; safe practices for disk sanding.

Drill Press. (63 pictures-82 frames) Jam Handy.

Introduction to the drill press; names and functions of parts; safe practices for setting up a drill press; safe practices for using a drill press.

Hand Tools—Hammers—Saws. (41 pictures-67 frames) Jam Handy.

Selecting, carrying, and arranging tools at the workbench; safe use of coping saws; handsaws; hammers.

Jointer. (62 pictures-83 frames) Jam Handy.

Introduction to the jointer, names and functions of parts; safe practices for setting up a jointer; safe practices for using a jointer.

Jig Saw. (76 pictures-96 frames) Jam Handy.

Introduction to the jig saw, names and functions of parts; safe practices for setting up a jig saw; safe practices for jig sawing.

Lathe: Faceplate Turning—Other Operations. (35 pictures-74 frames) Jam Handy.

Safe practices for setting up a lathe for faceplate turning; safe practices for faceplate turning; safe practices for sanding and polishing; safe practices for drilling.

Lathe: Parts—Spindle Turning. (74 pictures-86 frames) Jam Handy.

Introduction to the wood-turning lathe, kinds of wood-turning lathes, names and functions of parts; safe practices for setting up a lathe for spindle turning; safe practices for spindle turning.

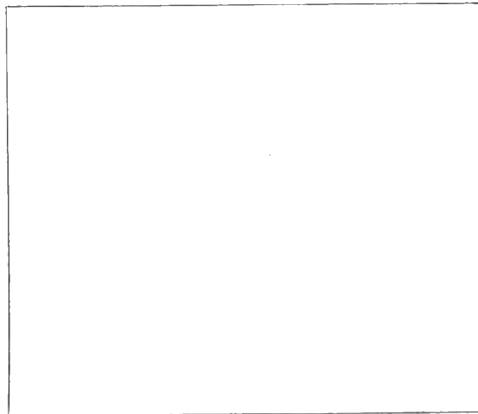
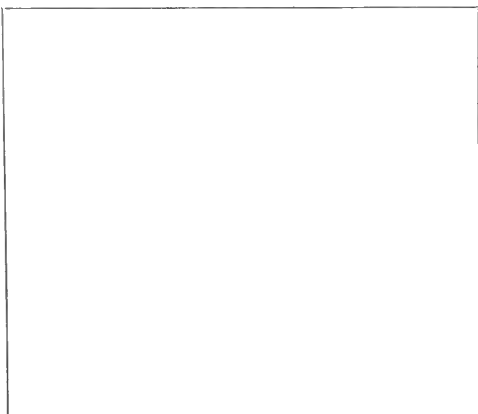
Planer. (47 pictures-75 frames) Jam Handy.

Introduction to the planer, names and functions of parts; safe practices for setting up a planer; safe practices for using a planer.

Planes—Bits—Knives—Chisels—Screwdrivers—Files. (52 pictures-72 frames) Jam Handy.

Safe use of smooth, jack, and jointer planes; bits and drills; chisels, gouges, and carving tools; knives; selecting and using screwdrivers; safe use of files and wood rasps.

PASTE IN LISTINGS OF NEW FILMS FROM PAGES OF BUSINESS SCREEN



A Glossary of Film Words*

A. C. Alternating current. Usually 60 cycles.

AMPLIFIER The vacuum tube system (like radio) which magnifies the sound impulses.

ANIMATION Cartoons or technical drawings which are made to move on the screen.

APERTURE The frame size opening in the projector which permits the light to strike the film and project it thru the lens.

BASE (safety) The cellulose acetate film material which supports the photographic image.

BEAD Tiny glass particles on the surface of a "beaded screen" to increase the light reflecting power.

BOOKING The reservation of films or equipment for a definite screening date.

BLOOP The peculiar sound issuing from the loud speaker when a film splice passes thru the projector.

BLOOPING The lacquering of a film splice to eliminate the sound of the "bloop."

CEMENT The solvent material used to hold two strips of film together. Used in splicing.

CONDENSER The immovable lenses in the projector between the lamp and the film. They condense diverging light beams into parallel rays.

CUT The place where one scene in a film stops and another scene starts without any "tricks" (fades or wipes).

D. C. Direct current. Most projectors operate on A.C. You may need a converter if current is D.C.

DISSOLVE The place where one scene in a film dissolves into the following scene.

EMULSION The gelatin with imbedded silver which forms the film image.

EXCITER The lamp which shines thru the sound track to the photo-electric cell in the sound projector.

FADE The place where one scene of a film gradually fades into or out of view.

FRAME (noun) A single complete scene on the film.

FRAME (verb) The centering of the scene on the screen. Done by turning a small knob or lever on the projector.

FREQUENCY The value scale of sound tones such as high, low and medium. Measured in kilocycles.

FUSE A small, low-melting-point wire in a projector which melts and stops the current flow if too much electricity enters the projector or if a short circuit develops.

GATE The hinged retainer plate which holds the film firmly against the aperture in a projector.

GELATIN The gelatinous coating on the film base which holds the silver image.

IMAGE A photographically-obtained likeness on a film emulsion.

NARRATION See Voice Over.

OSCILLOGRAPH A testing device to check the frequency of vibration and hence the capability of an amplifier in handling various frequencies.

POLARITY The direction in which electric current flows. D.C. projectors must receive current in the right direction. Wrong polarity can be corrected by withdrawing and reversing position of the plug.

REEL (spool) A spool on which film is wound and capable of being put onto a projector. Can be for any film capacity whatever.

REEL (of film) A unit of film length (400 ft. of 16mm film). 1, 2, 3, 4 or any fractional number of reels can be wound on a reel (spool).

RELEASE A generic term for films intended for general distribution or exhibition.

REWIND (noun) A cranking device for winding film on a reel (spool).

REWIND (verb) To wind a film after it comes off the projector onto another reel so that the title is at the outside (loose end) and the film is ready for re-showing.

SOUND TRACK The portion of the film (edge) on which the sound is recorded. It may be of varying degrees of density, or of varying area of clear stock with black borders.

SPLICE (noun) The place where two strips of film overlap and are cemented together.

SPLICE (verb) To make a splice of two strips of film.

SPROCKET The toothed wheels on the projector which engage the film and guide or pull it thru the machine.

SPROCKET HOLES The holes along the edge of film that are engaged by the sprocket wheels of the projector. Silent films have them on each edge. Sound films on one edge only.

STROBOSCOPE A Neon lamp and rotating disc testing device to check the speed of projectors.

STOCK Film. Consists of the base and an emulsion of gelatin and silver.

TRICK Any method used to end one scene and begin another. Also any method of having more than one scene in the frame at the same time.

WIPE The place in a film where one scene moves out of the frame and another moves into it.

VOICE OVER Any sound where the words are not synchronized with the lip movements of the actors in the film.

VOICE SYNC Any sound where the words are synchronized with lip movements of the actors.

*Courtesy of Encyclopaedia Britannica Films

Alphabetical Index of Titles

—A—

ABC of Pottery Making—The Coil Method	27	Airplane Structures: Control Surfaces	17
Abrasive Wheels	51	Airplane Structures: Fuselage Construction	18
A.C. & D.C. Generators	33	Airplane Structures: Manufacturing Methods	19
Across-The-Line Starters	36	Airplane Structures: Static Test	10
Adding or Removing Refrigerant	71	Airplane Structures: Structural Units	10
Addition & Subtraction	87	Airplane Structures: Wing Construction	18
Addition & Subtraction in Geometry	87	Airplanes	19
Addition & Subtraction of Fractions	87	Airplanes—Their Metals, Fuels, & Lubri-	
Adjusting & Checking the Expansion Valve	71	cants	19
Adjusting & Repairing Thermo Expansion Valve	70	Aircrew, The	14
Adjusting Commercial Thermostatic Controls	70	Alchemist in Hollywood	89
Adjusting Hydraulic Brakes	15	Aligning & Installing Auxiliary Machinery	74
Adjusting Mechanical Brakes	15	All Together	46
Adjusting Pressure Temp. Control Devices	70	All Work and No Play	16
Adjusting Valves	25	All-Electric Ship, The	37
Adjustment of Hydraulic Brakes	86	Allen Method of Modern Motor Tune-up	25
Adjustments After Check Flight	22	Alloy Steel	61
Advanced Typing: Duplicating & Manuscript	64	Alloy Steels—A Story of Their Development	61
Advanced Typing: Shortcuts	64	Alternating Current	31
Aerodynamics	9	Alternating Current Voltmeters & Ammeters	33
Aerodynamics: Air Flow	9	Aluminum	60
Aerodynamics: Forces Acting on an Airfoil	9	Aluminum: Fabricating Processes	60
Aerodynamics—Part 1: Properties of Air	9	Aluminum: Mine to Metal	60
Aerodynamics—Part 2: Lift	9	America First in the Air	15
Aerodynamics—Part 3: Resistance—Stream-		American Walnut	80
lining	9	Analytic Geometry	40
Aerodynamics: Theory of Flight	9	Analytical Balance Technique	28
Aerology: Ice Formation on Aircraft	9	Angular Measurement	41
Age of Flight	9	Anti-Freeze—A Story of Scientific Research	25
Air	9	Applications (Part I)	37
Air Currents and Theory of Streamlining	9	Applications (Part II)	37
Air Currents & Theory of Streamlining	86	Apprenticeships in Industry	83
Air Pressure in Which We Live	67	Arithmetic of Algebra, The	87
Air Wave	34	Around the Corner	26
Airco Process of Flame Hardening	61	Arteries of Industry	63
Aircraft and How They Fly	9	Asbestos	83
Aircraft Engine Operation	14	Assembling in a Jig (Drilling and Riveting)	16
Aircraft Engine Pumps	12	Assembling in a Jig (Fitting and Lining Up)	16
Aircraft Engine Troubles: General	13	Assembly of Parts for Rubber Boots & Shoes	47
Aircraft Engine Troubles: Starting	14	Assembly of Small Parts, The	47
Aircraft Engines: Carburetion	12	Assembly of Small Split-Phase Motors	32
Aircraft Engines: Elements of Electricity	11	Atacama Desert	28
Aircraft Engines—Types, Mechanisms & Oiling	11	Atmosphere and Its Circulation	9
Aircraft Factory, The	19	Atmosphere & the Airfoil, The	9
Aircraft Nomenclature—Part I: Parts	10	Atmosphere, The	30
Aircraft Nomenclature—Part II: Wings	17	Atmospheric Pressure	9
Aircraft Nomenclature—Part III: Floats—Hulls	15	Attaching & Aligning Wings	21
Aircraft Nomenclature—Part IV: Cockpits	17	Attitude Gyro, The	17
Aircraft Propellers—Hamilton Propeller	11	Audio Frequency Amplification	35
Aircraft Storage Batteries	12	Auto Mechanics	24
Aircraft Tires—Part I: Maintenance & Repair	21	Automatic Machine Cutting With Oxweld	76
Aircraft Tires—Part II: Maintenance & Repair	21	Automatic Packaging Machinery	47
Aircraft Welding	16	Automobile	27
Airplane and Its Parts, The	9	Automobile Cooling System	25
Airplane & Its Parts, The	10	Automobile Industry, Careers In	27
Airplane Engine	11	Auxiliary Views	37
Airplane Flight Control Surfaces & Wing Flaps	18	Aviation as a Career—Manufacturing	19
Airplane Hydraulic Brakes: Principles	15	Aviation Engine Disassembly & Inspection	11
Airplane Hydraulic Brakes: Types, Etc.	15	Aviation Series	23
Airplane Hydraulic Systems: BC-1 Airplane	15	Aviation Subjects	23
Airplane Ignition	12		
Airplane Mechanic, The	22		
Airplane Propellers: Principles and Types	14		
Airplane Riveting	15		
Airplane Sheet Metal Work	18		
Airplane Streamline Tires	15		
Airplane Structures: Alighting Gear	15		

—B—

Backbone of Progress	61
Bailey Bridge	87
Band Saw	91
Bar Folder	71
Bar Work—Magnesium, Part I	54
Bar Work—Magnesium, Part II	54
Bar Work—Magnesium, Part III	54
Basic Definition of Algebra	40
Basic Hydraulics	44
Basic Machines—The Drill Press	53
Basic Machines—The Lathe	54
Basic Machines—The Milling Machine	56
Basic Machines—The Shaper	57
Basic Principles of Lubrication	66

ALPHABETICAL INDEX OF TITLES

Basic Typing: Machine Operation	64
Basic Typing: Methods	64
Bearings	60
Behavior of Light	65
Behind the Camera	89
Behind the Scenes in the Machine Age	44
Behind the Shop Drawing	37
Belt Sander	91
Bending & Curving	71
Bending Copper Tubing to a Wire Template	73
Bendix Brakes	23
Bessemer & Open Hearth Steel	61
Better Methods—Less Fatigue, Etc.	47
Bevel Protractor, The	58
Beveling, Grooving & Rounding	65
Beveling, Mitering, Rabbeting, & Dadoing	80
Beveling, Stop Chamfering & Tapering	80
Big Little Things	46
Black Sunlight	82
Blanking & Piercing	71
Blanking & Punching	71
Blanking Sheet Metal on the Squaring Shear	71
Blanking Sheet Metal With Hand Snips	72
Blanking With Swing Arm Router	72
Blind Riveting	16
Blow Pipes	27
Boring Holes With Offset Boring Head	56
Boring to Close Tolerances	54
Brake Drums & Shoes	24
Brake Operating Linkage	24
Brakes & Landing Gear Mechanism. Part I	21
Brakes & Landing Gear Mechanism. Part II	21
Brazilian Quartz Goes to War	34
Brazing & Silver Soldering	78
Brazing Carbide Tools	76
Brazing Flanges With Silver Solder	73
Brazing Flanges With Spelter	73
Brick & Stone Masonry	28
Brick—From Clay to Pavement	27
Bridging a Century	87
Bridging Marble Canyon	87
Bridging San Francisco Bay	37
Bring 'Em Down Alive	22
Broaching an Internal Keyway	52
Building a Box Beam Spar	19
Building a Wooden Rib	19
Building the Golden Gate Bridge	37
Building Trades, Careers in	82
Bulkhead: Laying Off & Fitting a Centerline Stiffener	75
Bulkhead: Setting a Transverse Watertight Bulkhead Into Hull	75
Business Machines	89

—C—

Cabinet Making	81
Cable Splicing: Part I	17
Cable Splicing: Part II	17
Cable Surface Wiring	35
Cables	36
Cab-Over-Engine Truck	27
Calculation Instruments: Business Machines	40
Calculation Instruments: Graphical Methods	40
Capacitive Reactance	35
Capital Letters	37
Carbon & Its Oxides	30
Carbon, Calcium, etc.	30
Carburetor, The	42
Carding & Packing Steel Pins	47
Care & Cleaning of Photographic Lenses	66
Care & Cleaning of Plexiglas	69
Care & Cleaning of Spray Equipment	83
Care & Maintenance of Tapered Roller Bearings	60
Care & Repair of Flight Controls	21
Care & Use of Hand Shears, The	73
Careers for Cellulose	69
Catalysis	28
Cathode Ray Oscillograph	34

Cathode Ray Tube	34
Celite, The Story of the Diatom	83
Cement Finisher	82
Centering, Edge Grinding, & Beveling	65
Centering Small Stock	51
Centrifugal Force	68
Ceramic Engineering as a Career	28
Championship Typing	89
Characteristics of Liquids	28
Characteristics of Solids	29
Charging & Operating a Cupola	43
Chassis Electrical Systems	24
Check & Double Check	20
Checking & Replacing a Float Valve	71
Checking the Electrical System	71
Checking System—Part I: General Procedures	71
Checking System—Part II: Trouble Shooting	71
Checking Valve Clearance	25
Chemical Effects of Electricity	30
Chemical Reactions	29
Chemistry & a Changing World	29
Chemistry & Chemical Engineering as a Career	30
Chemistry of Combustion	29
Chips	54
Chisels	80
Chlorine & Its Compounds	30
Chuck Work—Part I: Setting Up Hex Turret	54
Chuck Work—Part II: Setting Up Tools	54
Circle, The—Chords & Arcs	40
Circle, The—Measurement of Angles	40
Circle, The—Tangents & Secants	40
Circular Saw; Parts—Installing a Blade	91
Circular Saw: Setting Up—Operating	91
Civil Engineering as a Career	37
Classification of Engine Types	11
Clay, Hands & Fire	86
Clay Pottery	87
Cleaning & Painting Tie Rods & Struts	22
Cleaning the Airplane	22
Cleaning the Power Plant	13
Cluster Welds	78
Clutch, The	26
Clutch, The (Part 1)	86
Clutch, The (Part 2)	86
Coal	82
Coal Mining	83
Coal Mining in Pennsylvania. History of	83
Cockpits & Cabins	22
Coils & Electric Currents	30
Cold Weather Starting	14
Collapse of the Tacoma Narrows Bridge	37
Colloid	29
Colloids	29
Combat Team	45
Common Mistakes & Their Correction	89
Complete Airplane, The	10
Completing the Transmission of Power	26
Compressed Air	90
Condensers & Choke Coils	31
Congruent Figures	87
Connecting & Adjusting Controls	21
Connecting Rods, Crankshafts, Bearings, etc.	11
Conquest of the Air	9
Constructing a Pipe Line—River Crossing	37
Construction	40
Construction of a Light Airplane	19
Construction of an Airfoil Template	10
Construction of the Diesel Engine, The	41
Construction That Endures	82
Contour Face Milling	52
Control of the Plane	10
Cooling System & The Fuel System, The	13
Cooling System, The	42
Cooling System, The	86
Copper & Its Uses	61
Copper Leaching & Concentration	60

Copper Mining in Arizona	60
Copper Nerves	24
Copper Refining	60
Copper Smelting	60
Copper Smelting & Refining	60
Corebuilding Low & High Tension Winding	32
Cornice Brake	72
Correct Working Methods	47
Correction of Boiler Foaming, The	83
Cotton, Civilization's Fabric	84
Countersinking, Counterboring & Spot Facing	53
Covering Hot & Cold Pipes	74
Covering With Fabric	18
Cresting Letters on Glasses	47
Crystallization	29
Current & Voltage Regulation	24
Current Electricity	31
Current Flashes	32
Current Generation—Parts I & II	31
Curve Control	26
Curves of Color	65
Cushioned Landings	15
Cutter Sharpening	49
Cutting a Dovetail Taper Slide	56
Cutting a Keyway on End of a Finished Shaft	57
Cutting a Round End Keyway	56
Cutting a Short Rack	56
Cutting a Taper with the Compound Rest, Etc.	54
Cutting an External Acme Thread	54
Cutting an External National Fine Thread	55
Cutting an Internal Acme Thread	55
Cutting an Internal Taper Pipe Thread	55
Cutting & Shaping Steel With Oxweld	76
Cutting & Threading Pipe by Hand	75
Cutting & Threading Pipe on a Power Machine	75
Cutting Cove Molding & Corebox	80
Cutting Grooves With Circular Saw Blades	80
Cutting Keyways	56
Cutting Teeth on a Worm Gear	53
Cutting Tenons & Segments	80
Cutting Threads With Taps and Dies	51
Cutting With Carbide Tools—Part I	53
Cutting With Carbide Tools—Part II	53
Cyclone Combustion	41
Cylinder & Piston Assemblies	13
Cylindrical Grinder	49

—D—

Dangerous Dusts	82
D.C. Motor—Part I: Mechanical Overhaul	33
D.C. Motor—Part II: Rewinding	33
Deck Girders: Sub-Assembly	75
Deck: Setting Web Frame & Transverse Beam	76
Deckplates: Regulating & Setting	75
Deep Horizons	66
De-Icer Servicing & Installation	18
Demonstrations in Reaction Time	47
Derivation of Involute Profiles	37
Design for Flying	10
Designing Core Boxes for Water-Cooled Motor Block	78
Designing Pattern for Water-Cooled Motor Block	78
Development of Communication	34
Development of Surfaces	37
Dial Indicator	58
Dial Indicator Gages	58
Die Casting	43
Die Casting the Super High Pressure Way	43
Diesel	41
Diesel Engine Governors: GM Series 71	41
Diesel Engine Governors—Part I	41
Diesel Engine, The	41
Diesel Simplicity	41
Diesel—The Modern Power	41
Diesels Working on the Railroads	83

ALPHABETICAL INDEX OF TITLES

Differential, The	26
Dimpling and Countersinking	16
Diode, The	34
Direct Current Controllers	32
Direct Current Voltmeters & Ammeters	33
Disassembling the Engine	11
Disc Sander	91
Discipline: Giving Orders	61
Discipline: Reprimanding	64
Distillation	29
Distributing Heat Energy	85
Do You Know Your Typewriter?	65
Doings of Turp & Time	29
Doorway to Happiness	82
Doping Technique	17
Double Ram Vertical Surface Broaching	53
Double Wasp Daily & Preflight Inspections	13
Double Wasp Magneto & Its Timing	11
Double Wasp Periodic Inspection	13
Douglas Fir Plywood	91
Down Draft Carburetor, The (Part I)	25
Down Draft Carburetor, The (Part II)	25
Down the Gasoline Trail	27
Dr. Langmuir—On Surface Chemistry	87
Drafting Tips	38
Drafting Training	39
Draftsman, The	87
Draw Bench Operations	73
Drawing an Anchor Plate	39
Drawing, Stretching & Stamping	72
Drill Press	91
Drill Presses—Part I	53
Drill Presses—Part II	53
Drilling a Hole in a Pin	53
Drilling & Tapping a Cast Steel Valve Body	53
Drilling, Boring & Reaming Work Held in Chuck	55
Drilling in Metal, Wood & Plastics	88
Drilling, Tapping, Stub Boring, & Reaming	52
Drilling to a Layout & Spottfacing	53
Drilling With Portable Drill Motors	16
Drills & Drilling	53
Driving and Bucking Rivets	16
Dynamotor Assembly & Inspection	32

—E—

Eastin Film Presents	90
Effect of Controls	10
Effective Working Methods	47
Eight Parts of a Business Letter	89
Einstein's Theory of Relativity	67
Electric Cell, The	31
Electric Heat in Industry	36
Electric Meters	33
Electric Motors	33
Electrical Circuit Faults	35
Electrical Engineering as a Career	37
Electrical Measurement	33
Electrical Measurements—Part I	33
Electrical Measurements—Part II	33
Electrical Measurements—Part III	33
Electrical Measurements—Part IV	33
Electrical Measurements—Part V	33
Electrical Workers	37
Electrically Heated Flying Suit, The	23
Electricity	31
Electricity & the Storage Battery—Part 1	31
Electricity & the Storage Battery—Part 2	31
Electricity at Work	31
Electrochemistry	30
Electrodynamics	30
Electrolysis, Reduction, Synthesis	30
Electromagnetism	31
Electron, The—An Introduction	30
Electron Theory	30
Electronics at Work	34
Electrons	30
Electrons on Parade	34
Electrostatics	30

ALPHABETICAL INDEX OF TITLES

Electrostatics—Part I	32
Electrostatics—Part II	32
Electrostatics—Part III	32
Elementary Operations on the Engine Lathe	55
Elements of Electric Circuits	35
Elements of Photography	90
Elements of the Automobile, The	27
Empires of Steel	61
Employing Blind Workers in Industry	45
Endfeed Grinding a Taper Pin	49
Endless Channels	25
Enduro Stainless Steel	61
Energy	68
Energy & Its Transformation	67
Energy & Its Transformations	85
Energy in Work	85
Engine Change: Installation	11
Engine Change: Removal	11
Engine Control Systems	25
Engine Instruments	25
Engine Lubricating Systems	25
Engine, The	86
Engine Tune-up	86
Engine Tune-Up (Part I)	25
Engine Tune-Up (Part II)	25
Engineer's Relation to Production	39
Equations & Formulas	87
Essential Parts and Types of Planes	10
Essentials of Wood Turning	80
Every Minute Counts	45
Evolution of the Oil Industry	66
Excursions in Science—No. 1	30
Excursions in Science—No. 2	30
Excursions in Science—No. 3	30
Excursions in Science—No. 4	34
Excursions in Science—No. 5	34
Excursions in Science—No. 6	58
Excursions in Science—No. 7	29
Excursions in Science—No. 8	68
Exhaust & Intake Manifolds: Ranger	12
Exhaust & Intake Manifolds: Whirlwind	12
Experiments in Physics	68
Explosive Engineer, The	37
Exponents & Logarithms	88
Exposure & Exposure Meters	90
Extractor Operations	47
Eyes of Science	65

—F—

Fabric Repair	21
Fabrication of Copper	64
Fabrication of Tubing	19
Face Milling With a Fixture	52
Face Planing Uneven Surfaces	80
Face Turning a Collar	81
Facing, Turning, Boring, Grooving, & Chamfering	52
Facts About Fabrics	84
Facts & Laws	30
Fair & Cool	46
Fashion's Favorite	85
Field Coil Winding	32
Field Inspection & Service—Wright Cyclone 14	13
Field Inspection & Service—Wright Cyclone 18	13
Files & How to Use Them	52
Filing an Internal Irregular Shape	56
Filing & Installing Chocks	74
Filing Template Metal	72
Fillet Welds—Steel	78
Film Editing	90
Filmstrips on Electric Welding	78
Fine Grinding Spherical Surfaces	65
Finish Forming By Hand	72
Finishing Rough Casting	59
Fire & Fuels	30

Fire & Heat	85
Fire Control	41
Fire Prevention & Precautions in Welding	90
First Impressions	64
First Principles in Grinding	49
Fitting & Scraping Small Bearings	51
5 C's of Business Letter Writing	89
Five Keys to Math	88
Fixed Gages	58
Flame Cutting of Billets & Bars	76
Flame Hardening by the Oxy-Acetylene Process	61
Flame Priming Drum Gates of Grand Coulee	61
Flanged Parts Tray	73
Flat Butt Welds	78
Flight Control Systems	17
Flight Instruments	21
Flight Log	66
Flow	44
Flow of Metals Into Molds	42
Flow, The Story of Valves	44
Flue Gas Analysis (Orsat Apparatus)	40
Fluid Flow in Hydraulic Systems	44
Fluid Highway Control	44
Flush & Blind Riveting	16
Folding and Packing Operations	47
Force	68
Force & Velocity as Vectors	68
Forces in Flight	86
Ford Rouge Plant	45
Foreman Training	46
Forest Treasures	91
Forge Welding	43
Forging & Machine Shop Operations	47
Forging & Upsetting Machines	43
Forging With a Hand Forge	43
Form Blocks & Forming	18
Forming Links for Portable Typewriters	48
Forming Methods	72
Forming on a Hand Operated Brake	72
Forming on Rotary Machines	72
Forming on the Stretching Machine	72
Forming Outside & Inside Flanges	18
Forming With a Drop Hammer	72
Forming With Rubber on Hydraulic Press	72
Foundry Work	43
Four-Speed Transmission	26
Four Steps Forward	64
Four-Stroke Cycle Int. Combustion Engine (1)	42
Four-Stroke Cycle Int. Combustion Engine (2)	42
Fractions, Decimals, & Percentage	88
Free Air	41
Free Hand Drawing	38
Freedom Rides on Rubber	84
Freight Train	83
Freight Yard	84
Friction	68
Friction Fighters	66
From Bristles to Brushes	82
From Desert Sands to Sparkling Glass	27
From Mine to Consumer	60
From Mountain to Cement Sack	82
Front Axles & Steering Gear	26
Frontiers of the Future	87
Fuel & Feed	12
Fuel & Oil Tank Repairs	12
Fuel & Oil Tank Repairs	78
Fuel Booster Pump, The	12
Fuel Feed Systems	42
Fuel Level Gages	12
Fuels & Engines of the Future	42
Fuels & Heat	85
Full Floating Rear Axle (Part 1)	26
Full Floating Rear Axle (Part 2)	26
Fundamentals of Acoustics	68
Fundamentals of End Cutting Tools	59
Fundamentals of Filing	51
Fundamentals of Side Cutting Tools	59
Furnaces of Industry	61

Furniture Craftsmen	80
Furniture Making	80

—G—

Gage Blocks & Accessories	58
Gaskets	11
Gasoline, The Manufacture of	67
General Principles of the Propeller	15
General Sheet Metal Practice	72
Generator & Regulator Systems; Principles	12
Generator Regulator, The	24
Generator, The	33
Generator, The	86
Geometric Construction—Part I	40
Geometric Construction—Part II	40
Get Going!	86
Getting Together	34
Giving a Shop Demonstration	88
Glass Blowing Technique	27
Glass Servant of Man	28
Glassing in Duraglas Containers	28
Gold & Silver	64
Good Engine Performance	25
Good Ignition	24
Good Photography is Flash Photography	90
Graph Uses	88
Gravitation	68
Gravitation of Liquids	68
Great Railroad at Work, A	84
Greatest Airship Dock	37
Grinding a Deep Hole	49
Grinding a Parallel Bar—Part I	49
Grinding a Parallel Bar—Part II	49
Grinding a Plain Pin—Part I	49
Grinding a Plain Pin—Part II	49
Grinding a Slender Shaft With Back Rest	49
Grinding a Straight Hole	49
Grinding a Taper	49
Grinding a Template	50
Grinding a V-Block	50
Grinding & Facing a Blind Hole	50
Grinding & Sharpening	51
Grinding Machines	51
Grinding Multiple-Point Carbide Tools	50
Grinding Practices	50
Grinding Single-Point Carbide Tools	50
Grinding Thin Discs	50
Grinding Wheel—Its Care & Use	50
Guided Bend Test, The	76
Gyro Compass	17
Gyrosyn Compass, The	17

—H—

Hacksaws	51
Hammers	81
Hand & Power Hack Saws	56
Hand Forming	18
Hand Sawing	81
Hand Soldering	77
Hand Tools	52
Hand Tools for Fabric Work	21
Hand Tools—Hammers—Saws	91
Handling the Airplane	22
Hard Facing	63
Hardness Testing (Rockwell)	58
Haynes Stellite the Plowshare	63
Heat	85
Heat & Its Control	85
Heat & Light From Electricity	30
Heat, Light, Sight	68
Heat-Treated Safedge Glassware	28
Heat Treating Hints	61
Heat Treatment	61
Heat Treatment of Aluminum—Film I	61
Heat Treatment of Steel: Hardening	61
Heat Treatment of Steel: Surface Hardening	61
Heat Treatment of Steel: Tempering, Etc.	61
Heavy Industries	61
Height Gages & Test Indicators	58
Heights & Depths	65
High Frequency Soldering	77

ALPHABETICAL INDEX OF TITLES

Higher Power Top Inch, The	42
Highlights & Shadows	65
Hinge Fitting	59
Hobbing a Helical Gear	54
Hobbing a Spur Gear—Part I	54
Hobbing a Spur Gear—Part II	54
Hobbing a Square Tooth Spline Shaft	54
Hobbing a Worm Gear, Infeed Method	54
Home Builders at Work	82
Horsepower	25
Hot Head, The	41
How Ether Anesthesia is Manufactured	29
How Motion Pictures Move & Talk	90
How Steel is Made	61
How to Build a House in 78 Minutes	82
How to Check & Surface Foundations	74
How to Develop an Intersection: Part I	39
How to Develop an Intersection: Part II	39
How to Drill	51
How to Finish Plywood	80
How to Form Aluminum	72
How to Machine Aluminum	19
How to Operate Mimeograph Duplicator	89
How to Rivet Aluminum	16
How to Run a Lathe	55
How to Use Filters	90
How to Use the Micrometer	41
How to Use Your Camera	90
How to Weld Aluminum	77
How You See It	90
Hyatt Bearings Division	89
Hydraulic Brakes	24
Hydraulic Brakes	86
Hydraulic Mechanisms	44
Hydraulic Struts	15
Hydraulics	44
Hypoid Rear Axle	26

—I—

Identifying & Precutting Cable	73
Ignition & Spark Plugs	24
Ignition Systems	24
Ignition System of the Wright Cyclone 18	11
Ignition Trouble	24
Improving the Job	45
In Nature's Workshop	29
Induced Currents	32
Inductive Reactance	35
Industrial Design	38
Industrial Motion Analysis	48
Inertia	24
Infeed Grinding a Shaft of Two Diameters	50
Infeed Grinding Shouldered Work	50
Ink Work & Tracing	38
Innerbottom: Setting Up Floors & Longitudinals	76
Innerbottom Section: Sub-Assembly of Closed Floor	76
Inserting Liner & Partition in Paper Boxes	48
Inside of Arc Welding	77
Inside of Atomic-Hydrogen Arc Welding	77
Inside Story of the Automobile Clutch	26
Inside Story—Oil, An	66
Inside the Flame	29
Inspecting & Adjusting Hydraulic Brakes	20
Inspecting & Reconditioning Piston Assembly	13
Inspecting & Reconditioning Valve Assembly	13
Inspecting & Small Assembly Operations	48
Inspecting the External Fuel System: Part I	12
Inspection Before Fabric Covering	20
Inspection of Minor Assemblies	20
Inspection of Plumbing & Piping	20
Inspection of Sheet Metal Parts	20
Inspection of Threads	58
Installation of 69KV Oil-Filled Cable	35
Installing & Aligning Tail Surfaces	21
Installing & Connecting Telltale Panel	73
Installing Conduit	35

ALPHABETICAL INDEX OF TITLES

Installing Landing Gear	20
Installing Surface Metal Raceway	35
Installing Valves & Strainer on Sea Chest	74
Installing Valves in Engine Room Systems— Part I	75
Installing Valves in Engine Room Systems— Part II	75
Installing Vitreous Fixtures	75
Instructing the Blind Worker on the Job	45
Instructing the Worker on the Job	45
Instruments and Materials	38
Intake & Exhaust Systems	12
Internally Threading a Plat—Making a Stud	56
Intersection of Surfaces	38
Introducing the New Worker to His Job	45
Introduction to Airplane Instruments	21
Introduction to Airplane Riveting	16
Introduction to Mechanical Drawing	87
Introduction to Oxyacetylene Welding	77
Introduction to Plane Geometry	40
Introduction to Preventive Maintenance	27
Introduction to Vectors	39
Introduction to Welding, An	78
Investigation of Some Hand Motions, An	48
Ionization, Neutralization, Nitrogen Cycle	30
Iron & Steel	61
Iron & Steel	62
Iron Industry in Pennsylvania	62
Iron Mining & Manufacturing	61
It's Easy When It's Alkaline	84
It's Our Job	45
It's Up to You	27

—J—

Jig Saw	91
Jigs & Fixtures	72
Job Analysis	48
Job Simplification Through Motion Study	48
Joining Solid Conductors	36
Jointer	91
Joining an Edge for Gluing—Installing Knives	81
Joining Edges & End Grain 90 Degrees to Face	81

—K—

Keep 'Em Flying	15
Keep 'Em Holding	23
Keep 'Em Landing	20
King Cotton	85
Knee Action (Part 1)	26
Knee Action (Part 2)	26
Knee Action (Part 3)	26
Knitting Mill Operations	48

—L—

Landing Gear—B-24D	21
Landing Gear & Brakes	15
Lathe: Faceplate Turning—Other Operations	91
Lathe Operation	55
Lathe: Parts—Spindle Turning	91
Lathes—Part I	56
Lathes—Part II	56
Laws & Theories	30
Laying Off the Boundary, Stiffeners, Etc.	76
Laying Out & Forming Plywood	19
Laying Out & Install. Compartment Fixtures	73
Laying Out & Install. Hangers	75
Laying Out & Install. Kickpipes & Stuffing Tubes	74
Laying Out & Install. Main Wireway	74
Laying Out & Installing Stern Tube, Etc. (1)	74
Laying Out & Installing Stern Tube, Etc. (2)	74
Laying Out & Installing Stern Tube, Etc. (3)	74
Laying Out & Installing Stern Tube, Etc. (4)	74
Laying Out, Drilling, & Tapping Flanges	74
Laying Out Small Castings	51
Layout Tools & Measuring Instruments	59
Layout Work—Part I	59
Layout Work—Part II	59

Lead	62
Lead Milling, Smelting, & Refining	62
Lead Mining in Southeast Missouri	62
Leather, A Trip Through a Modern Plant	85
Leather Tooling	85
Lenses	65
Lenses & Their Uses	90
Let Us See	90
Life Lines of Industry	44
Lift & Drag	10
Light	68
Light Waves & Their Uses	65
Lines & Angles	87
Listen—It's FM	34
Locating & Repairing Leaks	71
Locating Holes, Drilling & Tapping in Cast Iron	53
Locomotive Superheater	84
Locus	87
Lofting & Layout	38
Look to Lockheed for Leadership	19
Looking Through Glass	28
Low Down on the Tuneup, The	25
Lower Case Letters	38
Lubrication	66
Lubrication of Automobile	27
Lubrication of the Gasoline Engine	66
Lucite Carving	69

—M—

Machine, Master or Slave	45
Machine Shop Mechanics	59
Machine Technique (Part 1)	89
Machine Technique (Part 2)	89
Machine Tools	89
Machine Tools: Planers	58
Machine Tools: The Lathe	56
Machine Tools: The Milling Machine	57
Machine Tools: The Shaper	58
Machine Tools Used in Aircraft	59
Machine Transcription: Machine Operation	64
Machine Transcription: Transcription Tech- nique	65
Machining a Cast Iron Rectangular Block	88
Machining a Tool Steel V Block	58
Machining Work Held in Chuck—Use of Ref. Surfaces	55
Machinist, The	89
Made to Take It	24
Magic in the Air	87
Magic Key, The	29
Magic of Modern Plastics	69
Magic of Shoe Making	85
Magic of Steam, The	42
Magic Wand of Industry—Arc Welding	77
Magnesium—Metal From the Sea	63
Magnesium—The Miracle Metal	63
Magnetic Effects of Electricity	31
Magnetism	32
Magneto—Ignition Maintenance	13
Maintaining Good Working Conditions	45
Maintaining Quality Standards	45
Maintaining Workers' Interest	45
Maintenance of Office Machines	65
Maintenance of Storage Batteries	13
Major Assemblies & Disassemblies: Part I	15
Major Assemblies & Disassemblies: Part II	16
Major Body Repairs	24
Making a Cold Bend on a Hand-Powered Machine	75
Making a Core Box For a Flanged Pipe Elbow	78
Making a Core Box for a Machine Base	79
Making a Core Box for a Tail Print	79
Making a Core Box for a Vertical Core	79
Making a Five-Tuck Splice	17
Making a Master Contour Template	38
Making a Master Developed Layout: Part I	10
Making a Master Developed Layout: Part II	10
Making a Master Pattern & Core Box	79
Making a Match Board Pattern	79

Making a One-Piece Flat Pattern	79
Making a Pattern for a Flanged Pipe Elbow	79
Making a Pattern for Machine Molded Steel Globe	79
Making a Pattern for a Three-Part Mold	79
Making a Pattern Requiring a Cover Core	79
Making a Pattern Requiring Box Construction	79
Making a Pattern Requiring Segmental Construction	79
Making a Pattern Using Green & Dry Sand Core	79
Making a Pattern With a Horizontal Core	79
Making a Pattern With a Tail Print	79
Making a Pattern With a Vertical Core	79
Making a Round Metal Container	73
Making a Segmented Pattern	80
Making a Simple Core	43
Making a V-Type Engine	25
Making a Wrapped and Soldered Splice	17
Making & Drilling Riveted Patch	16
Making & Repairing Tubing Connections	70
Making & Shaping of Steel	61
Making Coal Gas & Coke	82
Making Curved Flanges	73
Making Glass	28
Making of Alloy Steel	89
Making of American Homes	82
Making of an Airplane Fitting	10
Making of Cold Drawn Seamless Steel Tubes, The	63
Making of Fine China	28
Making of Safety Glass	24
Making Sheet Metal Repairs	21
Manpower, Music & Morale	45
Manual Cutting a Bevel—Freehand	77
Manual Cutting a Shape—Free Hand Guided	77
Manual Cutting to a Line—Free Hand	77
Manufacture by Arc Welding	77
Manufacture of Anaconda Sheet Copper	60
Manufacture of Coated Abrasives	50
Manufacture of Dies	42
Manufacture of Laminated Glass	28
Manufacture of Lukens Clad Steels	62
Manufacture of P C Glass Bricks	28
Manufacture of Pennvernion Window Glass	28
Manufacture of Pig Iron	62
Manufacture of Plate Glass & Mirrors	28
Manufacture of Refractories	65
Manufacture of Structural Steel Shapes	62
Manufacture of the Incandescent Lamp	37
Manufacture of Tool Steel	62
Manufacture of Wire Products	64
Manufactured Abrasives	50
Manufacturing a Washing Machine Motor	32
Manufacturing Brick	28
Manufacturing Development in Pennsylvania	83
Marble, Vermont	82
Margin for Victory	22
Marvel of Gasoline Chemistry	90
Master of Molecules	67
Masterpieces of Mahogany	80
Material Handling Methods	48
Materials of War	84
Matter	69
Measurement Instruments—In the Laboratory	41
Measurement Instruments—Outside Laboratory	41
Measurement With Light Waves	40
Measurements & Measuring—Part I	41
Measurements & Measuring—Part II	41
Measuring Electrical Units—Part I	33
Measuring Electrical Units—Part II	33
Measuring Pipe, Tubing & Fittings	75
Mechanical Drawing	39
Mechanical Engineering as a Career	39
Mechanical Linkage	69
Mechanical Movements	69
Mechanics—Part I	69

ALPHABETICAL INDEX OF TITLES

Mechanics—Part II	69
Men at Work	46
Men Bet Their Lives on It	88
Men Make Steel	62
Men, Metals & Machines	63
Men's Clothing Industry	85
Messerschmitt 110 E	16
Metal Bumping & Hot Shrinkage	73
Metal Crystals	87
Metal Cutting Principles & Practices	53
Metal Drawings	39
Metal Forming in Airplane Production (1)	18
Metal Forming in Airplane Production (2)	18
Metal Forming in Airplane Production (3)	18
Metal Trades as a Career	73
Metal Working Lathe, The	55
Metallurgy & Organic Chemistry	30
Metals & Non-Metals	30
Metalsmiths' Tool Kit, The	19
Methods of Flight	9
Methods of Starting	14
Mica Industry	63
Micro Instrument Ball Bearings, Handling & Care	60
Micro Switches on Aircraft	17
Micrometer, The	58
Milling a Circular T-Slot	57
Milling a Helical Cutter	57
Milling a Helical Groove	57
Milling a Template	57
Milling Machine Operations	57
Milling Machine Practice	57
Milling Machine, The	57
Milling Machines	57
Mining & Smelting Copper	60
Mining of Sulphur in the Gulf Coast Region	89
Miracle in Wood	80
Miracle of a Locomotive, The	84
Miscellaneous Research Studies	48
Mixing & Using Casein Glue	19
Mock-Up & Tooling	38
Modern Aladdin's Lamp, A	34
Modern Coal Burning Locomotive	84
Modern Coal Mining	82
Modern Lithographer	65
Modern Metalworking With Oxyacetylene Flame	77
Modern Methods	48
Modern Photo Engraving	90
Modern Rug & Carpet Making	85
Modern Steel & Wire Mills	64
Modern Study Principles	48
Modern Valve Reconditioning	25
Molding a Horizontal Cored Part	43
Molding a Valve Body	43
Molding & Coremaking	43
Molding on Jolt Roll Over Pattern Draw Machine	44
Molding on a Jolt Squeeze Machine	44
Molding Part Having a Vertical Core	43
Molding Part With Deep Green Sand Core	43
Molding With a Gated Pattern	43
Molding With a Loose Pattern (Bench)	43
Molding With a Loose Pattern (Floor)	43
Molding With a Split Pattern	43
Molding With a Three Part Flask	43
Molecular Theory of Matter	29
Motion Study Application	48
Motion Study Applied to Factory Cleanup	48
Motion Study Economy	48
Motions of a Plane	9
Motors	33
Mountains of Copper	60
Mountains of Marble	82
Multiple Cylinder Engines	42
Multiple Field Coil Winding	32
Multiplication & Division	88
Multiplication & Division in Geometry	88

ALPHABETICAL INDEX OF TITLES

Multiplication & Division of Fractions 88
Multiview Drawing 38
—N—
New Continuous Process of Making Iron & Steel Sheets 62
New Horizons in Welding 90
New Men at Home 46
New Murray Method of Shell Manufacture, The 59
New Supervisor Takes a Look at His Job, A 45
New World Through Chemistry, A 69
Newton's Laws of Motion 69
Nickel 63
Nickel & Nickel Alloys 63
Nickel Milling & Smelting 63
Nickel Mining 63
Nickel Refining 63
1939 Summer Management Course 49
1940 Summer Management Course 49
1941 Summer Management Course 49
Nitrogen, Compounds of 30
No Substitute for Safety 20
Norris Dam Construction 37
Norton Abrasives in Tool Grinding 50

—O—

Occupations in Aircraft Manufacturing 19
Occupations in Cement Manufacturing 82
Occupations in the Steel Industry 62
Oil 67
Oil Filter Goes to War 67
Oil for Tomorrow 90
Oil From the Earth 67
Oil Systems 14
Oil-Filled Cable 36
On the Level 68
Operation & Use of Transformers, The 37
Operation of a Steam Locomotive 84
Operator & His Job, The 23
Operator & His Passengers, The 23
Operator & Safety, The 23
Optical Inspection by Projection 59
Order of Operations 88
Origin, Mining and Preparation of Penn. Anthracite 83
Origin of Algebra, The 40
Orthographic Projection 38
Other Specialized Machines 59
Overhauling Camshaft Assembly & Crank-case 13
Overhauling Crankshaft Assembly 13
Overhauling the Carburetor 12
Oxidation & Reduction 29
Oxygen & Hydrogen 30
Oxwelded Industrial Piping 63
Oxwelding & Cutting 77
Oxwelding & Cutting in Production 77
Oxwelding For Profit 77
Oxyacetylene Cutting 78
Oxy-Acetylene Welding in Industrial Production 77
Oxy-Acetylene Welding Light Metal 77

—P—

Painting Refrigerator Units With Spray Gun 48
Painting Ships & Boats: Applying Paint 74
Painting Ships & Boats: Preparing Surface 74
Paper in the Making 83
Paper Making 83
Parachutes 23
Parachutes: Construction & Care of Parachute 23
Parachutes: Folding & Packing 23
Parachutes for Safety 23
Parachutes: Inspection 23
Partners in Production 45
Passing the Know-How Along 46
Patching Fabric 21
Patching Plywood 21

Pattern Making 80
Peat & Coal 83
Peculiarities of Air 68
Periodic Inspection—Airplane 20
Periodic Inspection—Engine 20
Petroleum & Its Products 90
Petroleum Geology 67
Photography 90
Physical & Chemical Changes 30
Physics 69
Physics of Metal Cutting 53
Pin Board Study 48
Pipe Fabrication With Jigs 75
Pipe Line 67
Pitch Button & Blocking—Spherical Surfaces 66
Placing the Right Man on the Job 46
Plain Indexing & Cutting a Spur Gear 57
Plain Turning 55
Plane Performance 10
Planer 91
Planer & Shaper Operations 58
Planers 58
Planes—Bits—Knives—Chisels—Screw-drivers—Files 91
Planing a Dovetail Slide 58
Planing a Flat Surface 58
Planing Rough Surfaces to Dimensions 81
Planning & Laying Out Work 46
Plant Food From Coal 83
Plastics 90
PLASTICS
No. 1—Origin & Synthesis of Plastics Materials 69
No. 2—Methods of Processing Plastics Materials 69
No. 3—Compression Molding, Part I 69
No. 4—Compression Molding, Part II 69
No. 5—Molding a Part With Inserts 69
No. 6—Semi-Automatic & Hand Molding 70
No. 7—Injection Molding, Part I 70
No. 8—Injection Molding, Part II 70
No. 9—Finishing Molded Parts 70
No. 10—Machining Laminated Plastics 70
Pliers & Screwdriver 51
Plotting Graphs 40
Plunge Cut Grinding 50
Plywood Fleet 80
Plywood, the Miracle Wood 80
Points on Slidefilms 88
Polishing Spherical Surfaces 66
Porcelain Protected Surface Wiring 36
Positive & Negative Numbers 88
Pottery Making 87
Power 25
Power 69
Power and Octane 14
Power Behind the Nation 83
Power Bending Conduit 36
Power Brakes 24
Power by Wright 11
Power of a Minute 46
Power Plant Lubrication 14
Power Supply 89
Power Transmission Trouble 26
Power Within—Construction, Operation, Care 42
Practical Geometry 38
Precisely So 58
Precision at Work 55
Precision Gage Blocks 58
Prefabrication with Plywood 80
Preflight Inspection—Airplane 20
Preflight Inspection—Engine 20
Preheating Welding & Stress Relieving 77
Preparation for Fabric Covering 18
Preparing a Cupola for Charging 43
Preparing & Setting Keel Block & Bottom Cradle 76
Preparing for the Future 47

Preparing Old Buildings for Wiring	36
Preserve the Original Strength	10
Pressure Gages	10
Prevention & Control of Distortion in Arc Welding	77
Primary Cell	31
Principal Dimensions, Reference Surfaces & Tolerances	38
Principles of Current Electricity	31
Principles of Current Generation	31
Principles of Dry or Solid Friction	68
Principles of Electrical Measurement	33
Principles of Electromagnetism	31
Principles of Electrostatics	31
Principles of Internal Combustion Engine	42
Principles of Liquids & Gases	44
Principles of Lubrication	67
Principles of Magnetism	31
Principles of Moments	39
Principles of Physics	69
Principles of Refrigeration	70
Principles of the Electric Motor	33
Problem Analysis	88
Problems, Sulphur, Nomenclature, Formula Writing	30
Product Design & Molding Technique for Thermosetting Plastics	70
Production Control	46
Products of Progress	21
Profits of Progress	77
Progress Through Engineering	87
Progressive Honing, With Automatic Sizing	50
Propeller Maintenance	15

ALPHABETICAL INDEX OF TITLES

Rectilinear Figures—Polygons & Locus of Point	40
Rectilinear Figures—Quadrilaterals & Polygons	40
Rectilinear Figures—Triangles	40
Rectilinear Figures—Triangles & Parallel Lines	40
Redesigning a Pattern for Production Purposes	80
Reduced Voltage Starters	36
Redwood Saga	80
Refining of Crude Oil	67
Refining of Petroleum	67
Refueling the Airplane	22
Removing and Inspecting Cylinders	11
Removing & Installing Compressor or Condenser	71
Removing & Installing Cooling Unit	71
Removing & Replacing Power Plant in F4F	13
Removing, Cleaning & Replacing Cowl	14
Removing Defective Rivets	16
Repairing a Wooden Rib	21
Repairing Aircraft Tires	20
Repairing & Relining Mechanical Brakes	21
Repairing Channels & Stringers	22
Repairing Sheet Metal Surfaces	22
Repairing Structural Tubing	22
Reproducers	35
Repulsion Motors—Type SCR	33
Repulsion-Induction Motor: General Overhaul	33

SEND THE NEXT 8 COPIES OF BUSINESS SCREEN

TO _____

ADDRESS _____

CITY _____ STATE _____

Send bill at only \$2.00 to _____

PLEASE PRINT

PLEASE PRINT

No other form necessary; simply drop this card in the next mail

Waves	37
Radio Frequency Amplification	35
Radio Receivers: Principles	34
Radio Technician Training: Capacitance	31
Railroad Transportation	84
Ratio & Proportion	88
Rayon	85
Rayon, A New Frontier of Progress	85
Rayon, The Story of	85
Reading a Drawing of a Valve Bonnet	38
Reading a Three-View Drawing	38
Reaming, Tapping, & Threading	53
Reaming With Straight Hand Reamers	51
Reaming With Taper Hand Reamers	51
Rear Axles	27
Reassembling the Engine	11
Receiving Radio Messages	34
Recital of Faith	89
Recording & Reproduction of Sound	35
Rectilinear Co-ordinates	40
Rectilinear Figures—Angles & Triangles	40

Rough Grinding—Spherical Surfaces	66
Rough Grinding With Curvature Generator—Spherical Surfaces	66
Rough Line Boring	52
Rough Turning Between Centers	55
Roughing-In Non-Metallic Sheathed Cable	36
Rubber Industry, The	84
Rubber Reborn	84
Rule, The	41
Rules for Tools	52
Safe Handling of Oxygen & Acetylene Cylinders	91
Safe Scientific Methods Testing Armatures, Etc.	34
Safeguarding the Speechways	35
Safety Factors	27
Safety for Sale	47
Safety Glass	28
Safety in the Shop	46

ALPHABETICAL INDEX OF TITLES

Multiplication & Division of Fractions 88

Multiview Drawing 38

—N—

New Continuous Process of Making Iron & Steel Sheets 62

New Horizons in Welding 90

New Men at Home 46

New Murray Method of Shell Manufacture, The 59

New Supervisor Takes a Look at His Job, A 45

New World Through Chemistry, A 69

Newton's Laws of Motion 69

Nickel 63

Nickel & Nickel Alloys 63

Nickel Milling & Smelting 63

Nickel Mining 63

Nickel Refining 63

1939 Summer Management Course 49

1940 Summer Management Course 49

1941 Summer Management Course 49

Nitrogen, Compounds of 30

No Substitute for Safety 20

Norris Dam Construction 37

Norton Abrasives in Tool Grinding 50

—O—

Occupations in Aircraft Manufacturing 19

Occupations in Cement Manufacturing 82

Occupations in the Steel Industry 62

Oil 67

Oil Filter Goes to War 67

Oil for Tom 67

Oil From the 67

Oil Systems 67

Oil-Filled Ca 67

On the Level 67

Operation & 67

Operation of 67

Operator & I 67

Operator & I 67

Operator & S 67

Optical Inspe 67

Order of Ope 67

Origin, Mini 67

Anthracite 67

Origin of Al 67

Orthographic 67

Other Specia 67

Overhauling 67

case 67

Overhauling 67

Overhauling 67

Oxidation & I 67

Oxygen & Ily 67

Oxwelded Inc 67

Oxwelding & 67

Oxwelding & 67

Oxwelding Fe 67

Oxyacetylene Cutting 77

Oxy-Acetylene Welding in Industrial Pro- 78

duction 77

Oxy-Acetylene Welding Light Metal 77

—P—

Painting Refrigerator Units With Spray Gun 48

Painting Ships & Boats: Applying Paint 74

Painting Ships & Boats: Preparing Surface 74

Paper in the Making 83

Paper Making 83

Parachutes 23

Parachutes: Construction & Care of Para- 23

chute 23

Parachutes: Folding & Packing 23

Parachutes for Safety 23

Parachutes: Inspection 23

Partners in Production 45

Passing the Know-How Along 16

Patching Fabric 21

Patching Plywood 21

Pattern Making 80

Peat & Coal 83

Peculiarities of Air 68

Periodic Inspection—Airplane 20

Periodic Inspection—Engine 20

Petroleum & Its Products 90

Petroleum Geology 67

Photography 90

Physical & Chemical Changes 30

Physics 69

Physics of Metal Cutting 53

Pin Board Study 48

Pipe Fabrication With Jigs 75

Pipe Line 67

Pitch Button & Blocking—Spherical Sur- 66

faces 46

Placing the Right Man on the Job 57

Plain Indexing & Cutting a Spur Gear 55

Plain Turning 10

Plane Performance 91

Planer 58

Planer & Shaper Operations 58

Planers 58

Planes—Bits—Knives—Chisels—Screw- 91

drivers—Files 58

Planing a Dovetail Slide 58

Planing a Flat Surface 81

Planing Rough Surfaces to Dimensions 46

Planning & Laying Out Work 83

Plant Food From Coal 90

Plastics 90

PLASTICS

No. 1 Outline & Summary of Plastic

FIRST CLASS
Permit No. 21202
(SEC.510,P.L.&R.)
CHICAGO, ILL.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—
BUSINESS SCREEN INC.
157 EAST ERIE STREET
CHICAGO, ILLINOIS

Power Brakes 24

Power by Wright 11

Power of a Minute 46

Power Plant Lubrication 14

Power Supply 89

Power Transmission Trouble 26

Power Within— Construction, Operation, 42

Care 38

Practical Geometry 58

Precisely So 55

Precision at Work 58

Precision Gage Blocks 80

Prefabrication with Plywood 20

Preflight Inspection—Airplane 20

Preflight Inspection—Engine 77

Preheating Welding & Stress Relieving 18

Preparation for Fabric Covering 43

Preparing a Cupola for Charging 76

Preparing & Setting Keel Block & Bottom 47

Cradle

Preparing for the Future

Preparing Old Buildings for Wiring	36
Preserve the Original Strength	10
Pressure Gages	10
Prevention & Control of Distortion in Arc Welding	77
Primary Cell	31
Principal Dimensions, Reference Surfaces & Tolerances	38
Principles of Current Electricity	31
Principles of Current Generation	31
Principles of Dry or Solid Friction	68
Principles of Electrical Measurement	33
Principles of Electromagnetism	31
Principles of Electrostatics	31
Principles of Internal Combustion Engine	42
Principles of Liquids & Gases	44
Principles of Lubrication	67
Principles of Magnetism	31
Principles of Moments	39
Principles of Physics	69
Principles of Refrigeration	70
Principles of the Electric Motor	33
Problem Analysis	88
Problems, Sulphur, Nomenclature, Formula Writing	30
Product Design & Molding Technique for Thermosetting Plastics	70
Production Control	46
Products of Progress	21
Profits of Progress	77
Progress Through Engineering	87
Progressive Honing, With Automatic Sizing	50
Propeller Maintenance	15
Properties of Metals—Part I	41
Properties of Metals—Part II	64
Properties of Photographic Lenses	66
Properties of Water	29
Prosperity Process	77
Protected Power for Passenger Comfort	84
Protection of Metals—Part I	64
Protection of Metals—Part II	64
Proving Ground	70
Pulling & Installing Cable & Packing Terminal Tubes	74
Pumps	44
Punches, Drifts, & Bars	51
Pushrod Assembly	25

—Q—

Qualification Test for Welders	78
Quality Control	28
Quality in the Making	60
Quick Disconnect for Electrical Circuits	87
Quieting a Noisy Refrigerator	71

—R—

Rabbeting & Shaping Edge on Straight Stock	81
Radio Antennas: Creation & Behavior of Waves	34
Radio Frequency Amplification	35
Radio Receivers: Principles	34
Radio Technician Training: Capacitance	31
Railroad Transportation	84
Ratio & Proportion	88
Rayon	85
Rayon, A New Frontier of Progress	85
Rayon, The Story of	85
Reading a Drawing of a Valve Bonnet	38
Reading a Three-View Drawing	38
Reaming, Tapping, & Threading	53
Reaming With Straight Hand Reamers	51
Reaming With Taper Hand Reamers	51
Rear Axles	27
Reassembling the Engine	11
Receiving Radio Messages	34
Recital of Faith	89
Recording & Reproduction of Sound	35
Rectilinear Co-ordinates	40
Rectilinear Figures—Angles & Triangles	40

ALPHABETICAL INDEX OF TITLES

Rectilinear Figures—Polygons & Locus of Point	40
Rectilinear Figures—Quadrilaterals & Polygons	40
Rectilinear Figures—Triangles	40
Rectilinear Figures—Triangles & Parallel Lines	40
Redesigning a Pattern for Production Purposes	80
Reduced Voltage Starters	36
Redwood Saga	80
Refining of Crude Oil	67
Refining of Petroleum	67
Refueling the Airplane	22
Removing and Inspecting Cylinders	11
Removing & Installing Compressor or Condenser	71
Removing & Installing Cooling Unit	71
Removing & Replacing Power Plant in F4F	13
Removing, Cleaning & Replacing Cowl	14
Removing Defective Rivets	16
Repairing a Wooden Rib	21
Repairing Aircraft Tires	20
Repairing & Relining Mechanical Brakes	21
Repairing Channels & Stringers	22
Repairing Sheet Metal Surfaces	22
Repairing Structural Tubing	22
Reproducers	35
Repulsion Motors—Type SCR	33
Repulsion-Induction Motor: General Overhaul	33
Resistance	32
Rhapsody in Steel	27
Rib Stitching	17
Rib Stitching	18
Riding the Film	67
Rigging Changes After Flight Check	21
Right Material in the Right Place	61
Ripping & Cross-Cutting	81
Riveting—Part I: Drilling	16
Riveting—Part II: Gun Riveting & Bucking	16
Riveting—Part III: Flush Riveting	16
Rivets & Riveting	17
Romance of Glass	28
Romance of Industry, A (Abrasives)	50
Romance of Mahogany	80
Romance of the Gyroscope	17
Roofs	82
Rotary Head Tool & Die Milling Machine	59
Rotary Machines	59
Rotary Motion	69
Rotating Magnetic Fields	32
Rough Facing & Boring, & Turning a Shoulder on Vertical Turret Lathe	52
Rough Facing, Turning & Drill	52
Rough Grinding by Pin-Bar—Spherical Surfaces	66
Rough Grinding—Flat Surfaces	66
Rough Grinding—Spherical Surfaces	66
Rough Grinding With Curvature Generator—Spherical Surfaces	66
Rough Line Boring	52
Rough Turning Between Centers	55
Roughing-In Non-Metallic Sheathed Cable	36
Rubber Industry, The	84
Rubber Reborn	84
Rule, The	41
Rules for Tools	52

—S—

Safe Handling of Oxygen & Acetylene Cylinders	91
Safe Scientific Methods Testing Armatures, Etc.	34
Safeguarding the Speechways	35
Safety Factors	27
Safety for Sale	47
Safety Glass	28
Safety in the Shop	46

ALPHABETICAL INDEX OF TITLES

Sand & Flame	28
Sand Bag Bumping	18
Sanding Flat & Irregular Surfaces	81
Save Those Tools	51
Sawing Reverse Curve & Bevel Reverse Curve	81
Sawing an Internal Irregular Shape	56
Sawing Template Metal	72
Sawing With Jig & Changing Band	81
Scales & Models	39
School Bus Operation—Part I	23
School Bus Operation—Part II	23
Science in Business	44
Scraping	59
Scraping Flat Surfaces	52
Screw Threads	38
Sectional Views	38
Sectional Views & Projections, Finish Marks	38
Selecting the Right Thermosetting Molding Material	70
Sending Radio Messages	35
Series & Parallel Circuits	31
Servicing a Propeller	15
Servicing an Airplane	22
Servicing & Timing Magnetos	12
Servicing Hydraulic Systems	22
Servicing Spark Plugs & Ignition Wiring	12
Servicing the Aviation Spark Plug	12
Servicing the Oil System	14
Servicing the Sodium-Cooled Aircraft Valve	13
Servicing the Stromberg Carburetor	13
Servicing Water Cooled Condensers	71
Set Up for Face Milling With a Fixture	52
Set Up for Rough Line Boring	52
Setting Up & Lighting the Welding Torch	78
Setting Up & Machining Bar Stock	55
Shape of Things to Come	70
Shapers	89
Shaping After Template & Shaping Curved Edges	81
Sharpening a Form Relieved Cutter	50
Sharpening a Plain Helical Cutter	50
Sharpening a Shell End Mill	50
Sharpening a Side Milling Cutter	50
Sharpening an Angular Cutter	51
Sheet Copper	60
Sheet Metal Work	38
Sheet Metal Work	73
Shipping Room Operations	48
Shipways	90
Shirt Finishing Method, A	48
Shock Absorbers	27
Shock Absorbers	86
Shop Teaching	88
Shop Work	59
Short Course in Paper Making	83
Short Stops	86
Shrinking & Stretching of Angles	52
Side Frames: Sub-Assembly of a Web Frame	76
Sidelights on Siding	83
Simple Calculations for Flat Layouts	39
Simple Machines	68
Simple Machines	69
Sincerely Yours	67
Sinews of Steel	64
Single Ram Vertical Surface Broaching	53
Skill & Effort Rating	48
Slide Rule (Multiplication and Division)	40
Slide Rule (Percentage, Proportion, Squares, Etc.)	40
Slotted Anchor Plate	59
Small Split-Phase Motor Stator Winding	32
Small Stator Winding & Connecting	32
Smoke Streams	9
Smooth Starts	68
Soft Pedal	26
Soldering	78

Soldering & Small Assembly Operation	48
Soldering Lugs & Splicing Stranded Conductors	36
Soldering Tips	87
Some Principles of Teaching	88
Sorting Operations	48
Sound	68
Sound	69
Sound Pictures	35
Sound Recording & Reproduction	68
Sound Waves & Their Sources	68
Spark Plugs in Aviation	12
Specialized Machines (Turret Lathes)	56
Spinning (Aluminum)	73
Spinning Levers	26
Splicing a Wooden Spar	22
Split-Phase Motor: Rewinding	34
Spot Welding	16
Spray-Painting Equipment	83
Springs	26
Springs	27
Square Root & Cube Root	88
Squeeze Riveting—Portable and Stationary	16
Squirrel Cage Rotor Principles	32
Stability	10
Stability & Performance	10
Stainless Steel	62
Starting Motor, The	25
Static Electricity	32
Stator Coil Winding by Machine	32
Steam Locomotive	84
Steam Turbines	42
Steel	62
Steel—Man's Servant	62
Steel Plus	63
Steel Rule, The	58
Steering Gear, The	27
Stop That Car	23
Storage Battery Power	31
Storage Battery, The	37
Story of a Spark Plug	24
Story of a Storage Battery	24
Story of A-C Welding	77
Story of Aircraft Propellers, The	15
Story of Anthracite	83
Story of Arc Welding	78
Story of Bakelite	70
Story of Carbon Steel	62
Story of Coal	83
Story of Copper	61
Story of Electricity	31
Story of Formica	70
Story of Gasoline	67
Story of Leather	85
Story of Lubricating Oil	67
Story of Magnesium, The	63
Story of Metal Bellows, The	82
Story of Monel Metal	63
Story of Neoprene, The	84
Story of Nitrocellulose	29
Story of Rock Wool Home Insulation, The	85
Story of Steel	62
Story of Sulphur	29
Story of Synthetic Rubber	84
Story of the Chilled Car Wheel	42
Story of the Tire	84
Straddle & Surface Milling to Close Tolerances	57
Straddle Milling	57
Streamlined Steel	62
Stresses in an Airplane	86
Structural Drawing	38
Structural Steel Workers	78
Structural Units of the Airplane	10
Structures	18
Study of Eye & Hand Movements in Inspection	48
Study of Milling & Broaching	57
Study of Planing Operations	58
Study of Punch Press Operation	59

Study of Hand Motions	48
Study of Symmetrical Simultaneous Hand Motions, A	49
Study of Two-Handed Work With Variations	49
Sulphur	29
Sulphur & Its Compounds	30
Supervising Women Workers	46
Supervising Workers on the Job	46
Supervisor as a Leader, The—Part I	46
Supervisor as a Leader, The—Part II	46
Supervisory Development Program	47
Surface Chemistry	30
Surface Condenser, The	42
Surface Grinder, The	51
Swaging	88
Swaging Cable Terminals	17
Synchro-Mesh Transmission, The	26
Synthetic Rubber	84

—T—

Tachometers & Synchronism Indicators	14
Take a Letter, Please	65
Taking Dictation & Transcribing	89
Tale of the Iron Horse	84
Teaching a Vocation	88
Television	35
Template Reproduction	39
10,000 Feet Deep	67
Tension Testing	40
That High Power Top Inch	26
That the World May See	28
Theoretical Problem in Time & Motion Study, A	49
Theory & Operation of the Eight Pole Rotating Magnet & Secondary Condenser	36
Theory & Operation of Four Pole Rotating Magnet	36
There's a Difference	36
There's a Job to be Done	62
Thermodynamics	85
Thermometer	22
This is Steel	89
This Plastic Age	70
This Way Up	47
Thread Grinding with Jones & Lamson Equipment	59
Threads of a Nation	85
Three-Phase Motor—Part I: Preparing to Rewind	34
Three-Phase Motor—Part II: Rewinding	34
Three Phase Stator Winding	32
Three-Wire Service Entrance	36
Through Galileo's Telescope	66
Thrufeed Grinding a Straight Pin—Part I	51
Thrufeed Grinding a Straight Pin—Part II	51
Tin	64
Tinning & Solder Wiping	73
To Bee or Not to Bee—Fables for Foremen	47
To Greater Vision	90
Tool Box—Part I	73
Tool Box—Part II	73
Tool Box—Part III	73
Tool Grinder	89
Tornado in a Box	42
Transfer of Power	68
Transformers	37
Transmission, The	26
Traveling Electric Waves	31
Treasures of the Forest	91
Treating & Testing	40
Trees & Homes	80
Trees to Tribunes	83
Tricks of the Trade for Typists	89
Trigonometry	88
Triode, The: Amplification	35
Trouble Shooting Problems—Fuel Induction	12
Trouble Shooting Problems—Ignition	12
Trouble Shooting Problems—Mechanical & Lubrication	14

ALPHABETICAL INDEX OF TITLES

"T" Squares & Triangles—Part I	39
"T" Squares & Triangles—Part II	39
Tube & Shape Bending	73
Tube Bending by Hand	19
Tube Welds—Steel	78
Turning a Cylinder Between Centers	81
Turning a Taper With the Tailstock Set Over	55
Turning Taper Work	81
Turning Work in a Chuck	81
Turning Work on a Face Plate	81
Turning Work Held on a Fixture	55
Turning Work Held on a Mandrel	55
Turning Work of Two Diameters	55
Turret Lathe, The—An Introduction	55
Turret Lathes	56
Turret Tops (Part 1)	24
Turret Tops (Part 2)	24
Two-Speed Rear Axle, The	26
Tyneside Story	45
Types of Fuel Systems	13

—U—

Underground Raindrops	33
Unfinished Rainbows	60
Uniform Motion	69
Uniformly Accelerated Motion	69
Unionmelt Welding—an Electric Welding Process	78
Unionmelt Welding in Industry	78
Unionmelt Welding in Industry—General Applications	78
Units of Measurement	69
Unseen Worlds	36
Up-Draft Carburetor, The	26
Use & Care of the Filmo Sound Projector	90
Uses & Abuses of Twist Drills	53
Uses & Care of Hand Files	52
Uses of T-Square & Triangles	39
Uses, Unlimited	87
Using a Boring Bar Between Centers	56
Using a Follower Rest	56
Using a Shell End Mill	57
Using a Steady Rest	56
Using a Steady Rest When Boring	56
Using Visual Aids in Training	46
USS Cor-Ten	62

—V—

Vacuum Gear Shift	26
Vacuum Power Brakes	24
Vacuum Tubes	35
Vacuum Tubes: Electron Theory & Diode Tube	35
Valve Operating Mechanisms	42
Valves, Their Manufacture & Use	44
Vapor Lock	12
Vectors	88
Velocity of Chemical Reactions	30
Verniers	40
Vertical Welds—Steel	78
Vibratory Motions & Waves	68
Visualizing an Object	39
Voices Wrapped in Paper	36

—W—

Walls Without Weld Pipes	63
Water	30
Watts Regulation & Heavy Duty Regulators	24
We Give Them Wings	19
Welding	78
Welding Aluminum Flat Sheets	78
Welding Aluminum Tubes With Sheets	78
Welding as an Occupation	78
Welding Flat Ripples	78
Welding Operator	90
Welding Stainless Steel	78
Western Electric-Iowa Skill Study	49
What Iron & Steel Mean to Us	62
What is Electricity?	31

What is Good Gasoline?	67	Woodworker	91
What is Good Tune-Up?	26	Woolen Yarn, A	85
Wheel Alignment	27	Work	69
Wheel Alignment & Balance	27	Working on Air	86
Wheel Alignment (Dubonnet Type Knee-Action)	86	Working With Other Supervisors	46
Wheel Alignment (1939 Knee-Action)	86	World's Great Electrical Workshop	37
Wheel Balancing	27	World's Largest Plate Mill, The	62
Wheels, Rims, & Tires	27	World's Largest Telescope Reflectors	66
When You Can Measure	33	Worm's Turn, The	47
Where Mileage Begins	42	Wound Rotor Control	33
"Wildwood" A 100 Percent Mechanized Mine	83	Wrenches	52
Wing Assembly: The Bow Tip	19	Wright Builds for Air Supremacy	11
Wing Assembly: The Inboard Panel	19		
Wing Assembly: The Nose Section	19		
Wing Auxiliary Fuel Cells	20	X-Ray Inspection	40
Wing Forces	10	X-Ray, The	37
Wings for Defense	11		
Wire	64		
Wire Sizes and Voltage Drop	36	Years of Progress	86
Wiring Old Buildings With Armored Cable	36	Yesterday & Today	35
Wiring System, The	25	Youth Takes to Wings	9
Wiring Telltale Panel	74		
		Zinc	64

An Invitation to the Reader

The Editors of THE INDEX acknowledge the need for frequent correction, addition and elimination of titles included in this first training film guide. It is a beginning and a contribution to your better understanding of a real training opportunity for the large or small plant, vocational school, service organization and other establishments where such training can be profitably applied.

We invite your suggestions and comments. If you know of a good film, readily available, that has been omitted send it in today. If a film has been discontinued or is unsatisfactory for training use, let us know. *You* are the Editors of this guide; it is for your benefit—in industry and education—that these 104 pages of text and illustration have been so laboriously compiled.

Your comments on new visual training ideas, projection setups, new techniques for better utilization in the shop and classroom will help fellow trainers and help you. *Better* production—quality as much as quantity—is America's greatest need for a prosperous economy. *That which helps Production helps America.* In that spirit we conclude this first edition of THE INDEX and invite your correspondence and regular editorial participation.

The Editors of

THE INDEX OF TRAINING FILMS

ADDRESS: 157 E. ERIE STREET, CHICAGO (11) ILLINOIS

